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Pattern formation on ion-irradiated Si surface at energies where sputtering is negligible

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The effect of low energy irradiation, where the sputtering is imperceptible, has not been deeply studied in the pattern formation. In this work, we want to address this question by analyzing the nanoscale topography formation on a Si surface, which is irradiated at room temperature by Ar^+ ions near the displacement threshold energy, for incidence angles ranging from 0° to 85°. The transition from the smooth to ripple patterned surface, i.e., the stability/instability bifurcation angle is observed at 55°, whereas the ripples with their wave-vector is parallel to the ion beam projection in the angular window of 60°–70°, and with 90° rotation with respect to the ion beam projection at the grazing angles of incidence. A similar irradiation setup has been simulated by means of molecular dynamics, which made it possible, first, to quantify the effect of the irradiation in terms of erosion and redistribution using sequential irradiation and, second, to evaluate the ripple wavelength using the

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Full Paper

C-C Bond Cleavage by the Reaction of Cyclic Amines or Indoles with Activated Olefins: A Redox-Neutral Mechanism for the Reducing Action of Tetrahydroisoquinolines

Iftakur Rahman, Bhaskar Deka, Dr. Mohit L. Deb, Dr. Pranjal K. Baruah

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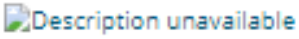
Graphical Abstract

Reaction of compounds having activated double bond in presence of tetrahydroisoquinolines (THIQ) undergoes C–C bond cleavage under solvent- and catalyst-free condition is reported. The THIQ is acting as reducing agent in this reaction. Further using indole in place of THIQ resulted in symmetrical/unsymmetrical bis(indolyl)methane formation using CAN as catalyst under solvent-free condition.



Abstract

Here we report the C–C bond cleavage through the reaction of tetrahydroisoquinolines (THIQs) or indoles with activated olefins. THIQ reacts with olefins under catalyst- and solvent-free condition resulting the formation of N-benzyltetrahydroisoquinoline *via* the C–C bond cleavage followed by reduction of iminium ion. Here, THIQ behaves as a reducing agent. On the other hand, when indole is used in place of THIQ in presence of ceric ammonium nitrate as catalyst under solvent-free condition, symmetrical bisindolylmethanes (BIMs) are obtained. The methodology could be further extended to synthesize unsymmetrical BIMs.

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From the journal:
Organic Chemistry Frontiers

Recent advances in intramolecular C–O/C–N/C–S bond formation *via* C–H functionalization

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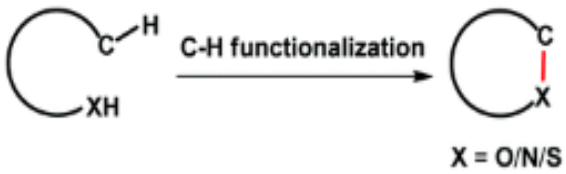
Abstract

This review focuses on the intramolecular cyclization of molecules through C–O, C–N and C–S bonds forming C–H functionalizations with an emphasis on the literature after 2000. Intramolecular C–H functionalization reactions attract much interest because of the ease of reaction due to the proximity of reacting centers and favorable entropy over intermolecular reactions. Less by-product formation, high atom economy, ease of purification, and avoidance of prefunctionalization of substrates are the additional advantages. Hence, a number of research articles have been published in this field, but no review is available so far. This review includes the synthesis of various heterocycles involving C–O, C–N and C–S bond creation. This is the first review on the current topic which will motivate the readers to work in this area further.



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Fabrication and characterization of thin targets of nickel (^{61,62}Ni) isotopes by physical vapour deposition technique for nuclear reaction studies

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ABSTRACT

To perform nuclear reaction experiments at HIRA, IUAC, New Delhi, thin (100–150 μg/cm^2) and pure ^{61,62}Ni targets of uniform thickness are required. Self supporting targets are preferable for such case but, instead, carbon-backed isotopic targets are fabricated by adapting physical vapour deposition technique as it was comparatively more stable and consistent. Around 25 thin targets of both ^{61,62}Ni isotopes are prepared using the limited amount of available enriched target material (less than 100 mg). The carbon-backed slides along with the parting agents are prepared using a diffusion pump based coating unit and the target material is deposited over the carbon-backed slides in the turbopump based coating unit. To obtain consistent and intact targets, some trials were done with deposited slides and was found that the material degrades in any of the slides when kept idle for few days. The thicknesses of the targets are verified using profilometer, α energy loss technique, and RBS technique. They were found to be in good agreement with each other using the three techniques. The purity and the uniformity of the fabricated targets are further confirmed after verification using the RBS, the EDS and the XRD techniques.

1. Introduction

For the nuclear reaction to occur, two essential ingredients are required - a good quality projectile beam and the target of very good quality with uniform thickness where the beam bombards. In fact, the features of target required must be such that its thickness should be appropriate as per the requirement of experiments, its surface has to be smooth, contamination in it should be as minimal as possible and it should be homogeneous [1,2], which poses a serious challenge during its fabrication. For the study of a heavy ion induced nuclear reaction, thin self-supporting targets with areal density ranging from few μg/cm^2 to a few mg/cm^2, are preferable. The energy loss of projectile beam and of the trapping of reaction products within the target will then be minimised due to its small thickness which ultimately gives better experimental resolution in the measurement of low energy nuclear reaction. Hence clear spectrum with better separation of different reaction products can be obtained. Accordingly, ion beam sputtering and thermal evaporation techniques are supposed to be the most effective methods in order to prepare thin self-supporting targets [3,4]. But sometimes obtaining a very thin self-supporting target foil (especially for high Z materials) becomes a very tedious job, may be due to certain complications involved in the deposition which give experimental limitations. Thus to avoid these difficulties, target materials are evaporated on a thin lower Z backing material (e.g. carbon) foil (≈ 30 μg/cm^2) through which the energy loss and energy straggling effects will be minimised before reaching the target material, without affecting mass resolution, so that a precise time-of-flight (TOF) measurement for the proper count of reaction product yields can be obtained. Moreover, carbon does not react with most of the metals which qualifies it as the first choice as the backing material.

Various procedures and backing composition of Ni target fabrications are already available in the literature [5,6]. Chelisov [7] and Sosnin [8,9] described the methods of obtaining highly enriched Ni isotope using centrifugal enrichment process. The fabrication of self-supporting Ni target using rolling technique and evaporation technique (a deposition method based on the vibrational motion of micro-particles in the electrostatic field) are respectively reported in Refs. [10,11] and Refs. [12,13]. Gallant [14] and Stolarz [15] fabricated Ni target on the large area (for document imaging) and fine plastic-backings respectively. Ni element is even used as backing substance by Greene et al. [16] in which Bi target is deposited. Here, in this paper, preparation of a carbon backed thin target of enriched ^{61,62}Ni (≈ 100–150 μg/cm^2)

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Sub-barrier fusion in the $^{37}Cl + ^{130}Te$ system

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Background: In heavy-ion induced reactions, the sub-barrier fusion cross sections are found to be higher as compared to the predictions of the one-dimensional barrier penetration model. Attempts have been made to explain sub-barrier fusion enhancement by including the static deformations, the couplings to inelastic excitations, and non-fusion channels.

Purpose: To investigate factors which influence the sub-barrier fusion in the $^{37}Cl + ^{130}Te$ system and to understand the interplay of couplings, the fusion excitation function was measured at energies from 10% below to 15% above the Bass barrier.

Method: The fusion excitation function was measured by employing a recoil mass spectrometer, the Heavy-Ion Reaction Analyser (HIRA), at the Inter-University Accelerator Centre, New Delhi. To study the behavior of the fusion excitation function and the effect of couplings at sub-barrier energies, the excitation function was analyzed in the framework of the coupled-channels code CCFULL.

Results: In the present work, the fusion cross section was measured down to 1 μb at the lowest measured energy, i.e., 10% below the barrier. It was found that the inclusion of couplings of low-lying excited states along with the modified barrier between interacting nuclei satisfactorily reproduces the fusion excitation function of the $^{37}Cl + ^{130}Te$ system. For better insight into the sub-barrier fusion, the fusion barrier distribution, the logarithmic derivative $L(E)$ factor, and the astrophysical S factor were extracted from the analysis of the experimentally measured fusion excitation function.

Conclusions: The analysis of the fusion excitation function in terms of the astrophysical S factor and the $L(E)$ factor suggests the absence of fusion hindrance in the $^{37}Cl + ^{130}Te$ system down to a 1 μb cross section achieved at the lowest measured energy. The excitation function of the present system is compared with the existing measurements in which ^{37}Cl has been used as a projectile to understand the interplay of entrance-channel parameters in sub-barrier fusion enhancement.

DOI: 10.1103/PhysRevC.99.024607

I. INTRODUCTION

In heavy-ion induced reactions, a massive rearrangement of a complex quantum system takes place with the repetitive interactions of all nucleonic degrees of freedom between the interacting partners [1–4]. According to the simplest barrier-passing model, fusion occurs only if the energy of the incident projectile overcomes the residual barrier, formed due to equilibration of an attractive nuclear potential and the repulsive Coulomb potential between the interacting partners. However, it has been found that the nuclear interactions lead to fusion even at sub-barrier energies, i.e., $E_{c.m.} \leqslant V_b$, which has been attributed to the quantum tunneling through the barrier [5], termed the one-dimensional barrier penetration model (1D BPM). A significant enhancement in the sub-barrier fusion cross sections over the predictions of the 1D BPM has been observed [1,2]. Hence, nuclear fusion around the barrier has been extensively investigated in the past few decades to improve the understanding of the underlying dynamics [2,6–13].

The enhancement in sub-barrier fusion cross sections provides a doorway to introduce the effect of static and dynamic deformations and, subsequently, the coupling of inelastic excitations [14,15]. These couplings transform the one-dimensional single barrier into multiple barriers and,

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Rapid Communications

Collective enhancement in nuclear level density

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Several experimental investigations have reported evidence of collective enhancement of the nuclear level density and its fadeout. However, a suitable method is needed for experimental determination of the enhancement factor as a function of excitation energy. In this study, neutron spectra were measured in coincidence with evaporated α particles produced in the reactions ^{11}B + ^{181}Ta, ^{197}Au. The nuclear level density parameter has been extracted for the Os ($A \approx 188$) and Pb ($A \approx 204$) isotopes by comparing neutron spectra with statistical model prediction. Evidence for collective enhancement has been found for Os nuclei whereas no such enhancement has been seen for Pb nuclei. The energy-dependent enhancement factor has been extracted by simultaneous fitting of the neutron spectra at various excitation energies. Near a temperature of 0.8 MeV, the enhancement starts to fadeout which is lower than the theoretically predicted temperature of 1.4 MeV for ^{187}Os. Also, free energy surface calculation shows that the ^{187}Os nucleus undergoes a transition from collective prolate to noncollective oblate shape close to the temperature of 0.8 MeV, corroborating the early fadeout. No such shape transition is seen for ^{203}Pb.

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The properties exhibited by atomic nuclei are a manifestation of either its single-particle nature or collective degrees of freedom and the interplay between the two. Nuclear level density is one such physical quantity where the single-particle and collective natures coexist [1–3]. The nuclear level density for a spherical nucleus with excitation energy U and angular momentum J is given by [2,4]

$$\rho(U,J) = \frac{2\pi(2J+1)}{\sqrt{8\pi}\,\sigma^2} \exp\left\{-\frac{J(J+1)}{2\sigma^2}\right\} \rho(U). \quad (1)$$

Here σ is the spin cutoff factor and $\rho(U)$ is the total number of levels at an energy U. For a deformed nucleus, depending on the level of symmetry, each intrinsic state gives rise to rotational bands which enhances the level density over that of a spherical nucleus. This enhancement is of the order of σ^2 for an axially deformed nucleus rotating about an axis perpendicular to the symmetry axis and of the order of σ^3 for nuclei with no rotational symmetry. As the degree of rotational symmetry increases, the enhancement is destroyed. Similarly, vibrational collectivity can also cause enhancement in the level density but the magnitude is small compared to the rotational enhancement [2,5,6]. At sufficiently higher temperature no distinction can be made between rotational

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Measurement of neutron multiplicity to investigate the role of entrance channel parameters on the nuclear dissipation

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In the present work, the pre- and post-scission neutron multiplicities were measured for the reaction $^{18}O + ^{186}W$ at different excitation energies populating the compound nucleus ^{204}Pb, using the National Array of Neutron Detectors (NAND) facility at IUAC, New Delhi, India. Here, we investigated the entrance channel effect on the nuclear dissipation involved in the heavy ion fusion-fission dynamics. The statistical model analysis was performed using the code VECSTAT. The prescribed reaction $^{18}O + ^{186}W$ had similar value of the mass asymmetry as the system $^{32}O + ^{181}Ta$ studied earlier, populating the compound nucleus ^{207}Tl. Specifically, we observed the similar behavior from both the systems against the nuclear dissipation, with the similar value of the mass asymmetry. The role of the entrance channel parameters on the nuclear dissipation was also discussed in the present work.

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I. INTRODUCTION

The study of heavy-ion induced fusion-fission reactions is an interesting topic in the domain of nuclear physics, investigated by theoretical as well as experimental approaches. Here, the projectile is captured by the target nucleus and a compound nucleus (CN) is formed, equilibrated in all degrees of freedom. The fusion-fission process of the excited compound nucleus can be understood by the evaporation of particles such as alpha, proton, neutron, gamma, and fission fragments. In the collision between two heavy nuclei, quasifission as well as fusion-fission have a considerable contribution in the process. The measurement of the pre-scission multiplicity of light charged particles [1,2], the neutrons [3–5], and GDR γ rays [6,7], evaporation residue cross sections [8,9], and the mass and angular distribution of the fission fragments [10,11] are well-established tools to understand the heavy-ion induced fusion-fission process.

In the fusion-fission process, dynamical effect plays a crucial role, slowing down the decay process of the CN. To understand the fission hindrance, the multiplicity of the different type of particles is experimentally measured, which is higher than the standard statistical model predictions [12,13]. The excess yield of the particle multiplicity from the heavy compound system indicates the slowing down of the fission process, described by the transition-state model of the fission [14]. The slowing down of the fission process or fission hindrance can be understood incorporating the concept of the nuclear dissipation. The dynamical effects are present in the decay of CN from the presence of nuclear viscosity. The nuclear dissipation is one-body in nature [15], which is described by incorporating the concept of wall and window friction. Fission delay time is also calculated for the excess pre-scission neutrons [10,16], directly related to the magnitude of the nuclear dissipation.

Nuclear dissipation is one of the most interesting topics in nuclear physics at the lower and intermediate energy. Nuclear dissipation is caused by the the coupling of the collective

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Theoretical aspect of the deformation effect on fusion cross-sections induced by heavy ion systems $^{16,18}O + ^{58}Ni$ and ^{112}Sn

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Applying twelve different versions of nuclear potentials, the influence of static quadrupole and hexadecapole deformation of targets and its orientations on the fusion cross section have been studied. The barrier parameters for the reactions $^{16}O + ^{58}Ni$, $^{16}O + ^{112}Sn$ and $^{18}O + ^{112}Sn$ have been estimated from the variations of total interaction potential with the inter-nuclear separation which is then used to determine the fusion cross section for the systems through Wong's formula. It has been found that the nucleus-nucleus potential strongly depends on the deformation parameters and orientation of the target. The experimental fusion cross-section of these reactions (wherever available) have been investigated by applying Wong's formula along with the results of a one-dimensional barrier penetration model using coupled – channel (CCFULL) code. The fusion cross-sections by Prox 10, Prox 88, Prox 00, Prox 00 DP, CW 76, Ng5 80 and AW 95 potentials have been found out to be in better agreement towards the experimental data.

Keywords: Nuclear potentials, Deformation, Orientation, Fusion cross-section, Wong's formula

1 Introduction

The fusion cross sections studies around the coulomb barriers is in present trend[1]. Fusion reactions around barrier energies are influenced by the entrance channel parameters, namely, the mass asymmetry, the deformation of the interacting nuclei. In terms of experimentally as well as theoretically, it has been exhibited that the fusion cross-section at near barrier energies of spherical, nearly spherical and well-deformed nuclei of either of the colliding partners in the ground state is strongly enhanced by deformation[2]. The quadrupole (β_2) and hexadecapole (β_4) deformation and its orientation with the colliding axis were found to affect the sub-barrier fusion reactions and the fusion barriers and hence the fusion cross-section[3,4]. Such behaviour is thus, investigated here using the orientation dependent potential, with parabolic approximation.

The fusion barriers information is generally extracted from the experiments with the help of different theoretical models[5-7]. The backbone of those theoretical model is basically the nucleus-nucleus interaction potentials[8,9]. Quite a few of those models predict the fusion dynamics of a large number of reactions[10-12]. Among these, widely used phenomenological proximity potential[13] is reported here and is parameterized it within the proximity concept for wider acceptability[10]. Several refinements and modifications have been proposed over original proximity potential[14] due to which, with the passage of time, different versions of the same model are available[10-12].

In this paper, the fusion cross-sections induced by spherical nuclei, ^{16}O and ^{18}O are investigated on slightly deformed and the two successive semi magic target nuclei in the medium mass region (^{58}Ni and ^{112}Sn), having low deformation parameters, within the theoretical approach, in order to determine the role of static deformed potentials at sub-barrier energies. The deformation parameters here are ^{58}Ni ($\beta_2 = 0.093$, $\beta_4 = -0.008$)[15] and ^{112}Sn ($\beta_2 = 0.003$, $\beta_4 = -0.008$)[15,16]. Using twelve different versions of global nuclear proximity potentials, the interaction barrier parameters, viz., the interaction barrier heights, the barrier radii and the barrier curvature (all being orientation (θ) dependent, where θ is the angle of the symmetric axis of a deformed nucleus with the collision axis) are determined for the three reactions ; $^{16}O + ^{58}Ni$ (Ref. 17), $^{16}O + ^{112}Sn$ (Ref. 18) and $^{18}O + ^{112}Sn$. The fusion cross-sections obtained after applying these parameters for the nucleus – nucleus potential are then compared with the experimental data, wherever applicable, along with the equivalent calculation using a one-dimensional barrier

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Fabrication and characterization of enriched ^{154,144}Sm and ^{142,148}Nd targets on Al-backing for nuclear physics experiments at IUAC, New Delhi, India

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The enriched targets of stable isotopes ^{154,144}Sm and ^{142,148}Nd have been fabricated for the measurements of excitation functions and recoil range distributions studies using different heavy ion projectile at IUAC, New Delhi. These targets have been fabricated by electron gun evaporation on Al backing. A very thin capping has been applied to prevent material from getting oxidized and eventual deterioration of material itself. The enriched ^{154,144}Sm and ^{142,148}Nd samples have been capped by carbon and aluminium, respectively. These samples of multiple thicknesses have been prepared using a high vacuum evaporation chamber facility. The thickness and uniformity of the different samples have been measured by Rutherford backscattering spectrometry (RBS) and energy dispersive x-ray spectroscopy (EDXS). These measurements also confirm that there are no unwanted impurities in the prepared targets. Large number of sandwiched targets, more than 30, of ^{160,154}Sm and ^{142,148}Nd isotopes have been successfully fabricated in a single evaporation. In the present study, the sandwiched targets have been fabricated using high vacuum evaporation technique. This technique is a very useful and cost efficient method to prepare large number of thin isotopic enriched targets having oxidizing property for experimental nuclear physics.

Keywords: Vacuum evaporation, Thin film, Oxidized target fabrication, Rutherford backscatterings pectrometry, Energy dispersive x-ray spectroscopy

1 Introduction

It has been possible to study the nuclear structure and nuclear reaction dynamics in heavy ion interaction with the advancement of modern accelerators. Several modes of nuclear reactions are possible in heavy ion collisions at energy above the coulomb barrier. The complete fusion (CF) and incomplete fusion (ICF) reactions are the two dominate modes of reaction at these energies[1]. The first experimental evidence of ICF reactions in the break-up of the projectile at beam energy ~10.5 MeV/nucleon was reported by Britt & Quinton[2]. The CF and ICF processes can be classified on the basis of driving input angular momenta (ℓ) involved during interaction of projectile with target. In the sharp cut-off approximation[3], the driving input angular momentum "ℓ" is imparted in the range $0 \leq \ell \leq \ell_{crit}$ for CF process. In this process, the attractive nuclear potential overcomes the repulsive Coulomb and centrifugal potentials in central and near-central collisions. As a result, at relatively lower values of energy and impact parameter, the projectile completely fuses with the target and forms a fully equilibrated compound nucleus (CN). This CN nucleus may decay by emitting light particles. However, when projectile collide with target at relatively higher value of energy and impact parameter, the repulsive centrifugal potential increases. Hence, the attractive nuclear potential is unable to capture the entire projectile. In this condition, only a part of the projectile fuses with the target nucleus and remnant behaves as a spectator. This process is termed as incomplete fusion (ICF) or breakup fusion (BUF). It is not well established how different entrance channel parameters affect the ICF dynamics at intermediate energies. As such, this phenomenon is still an active area of investigation.

A series of experiments has been planned to perform EFs and FRRDs measurements using the alpha and non-alpha clusters ion-beam with enriched ^{154,144}Sm and ^{142,148}Nd targets. These studies will provide some definite conclusions about the role of various entrance channel parameters namely; mass-asymmetry of the system, coulomb factor (Z_PZ_T), target deformation etc. on ICF dynamics. Thin targets

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PAPER

Surface scaling behaviour of size-selected Ag-nanocluster film growing under subsequent shadowing process

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Article and author information

Abstract

Surface morphology of size-selected silver nanocluster films grown by dc magnetron sputtering has been investigated by means of an atomic force microscopy (AFM). From the height-height correlation functions obtained from corresponding AFM images, the scaling exponents are calculated and two types of growth regimes have been observed. In the first regime, the growth exponent is found to be $\beta_1 = 0.26 \pm 0.01$ close to the Kardar–Parisi–Zhang growth exponent, while in the second growth regime shadowing effect plays dominant role which gives the growth exponent value $\beta_2 = 0.85 \pm 0.15$. On the other hand for the whole deposition regime, the roughness exponent value is found to be constant around $\alpha = 0.76 \pm 0.02$. UV–Vis spectroscopy measurement suggests how the average reflectance of the film surface changes with different growth times.

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Communication

Diastereoselective sp3-C–H Functionalization of Arylmethyl Ketones and Transformation of *E*- to *Z*-Products Through Photocatalysis

Gaurav K. Rastogi, Bhaskar Deka, Mohit L. Deb, Pranjal K. Baruah

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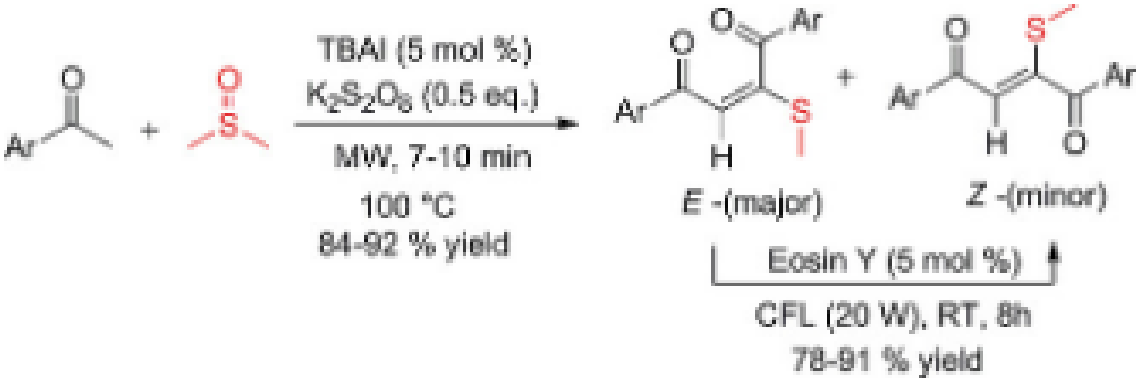
Graphical Abstract

A Metal-free synthetic route for 1,4-enedione derivatives under microwave irradiation from the reaction of arylmethylketones with DMSO or diphenyl sulfoxide was developed. *E*-isomers of the products can be transformed into *Z*-isomers through visible light promoted photocatalysis.



Abstract

We have developed an efficient metal-free route for the synthesis of 1,4-enedione derivatives under microwave irradiation by reacting easily available arylmethylketones with DMSO or diphenyl sulfoxide in the presence of TBAI and persulfate. The reaction is very clean and completes within very short time. All the reagents and catalysts are cheap and environmentally benign. In addition, the *E*-isomer of the products can easily be transformed into the *Z*-isomer by using eosin Y photocatalyst under the irradiation of white CFL.

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Applied Surface Science

Volume 526, 1 October 2020, 146645

Evolution of ion-induced nano-dot patterns on silicon surface in presence of seeding materials

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https://doi.org/10.1016/j.apsusc.2020.146645

Highlights

- Prominent dot-patterns are evolved on the surface induced by seeding.
- Co-deposition of metal impurity has no direct effect on pattern formation.
- Patterning is attributed to the interplay between the surface and impurity atoms.
- Immobile metal-silicide bond formed on the surface are responsible for patterning.

Abstract

In this report, a comprehensive study on ion beam patterning of Si surface with simultaneous co-sputtering of stainless steel (SS) has been described. The experiment has been carried out using 500eV energy Ar^+ ion beam sputtering at normal ion

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From the journal:
Organic & Biomolecular Chemistry

L-Proline-catalyzed regioselective C1 arylation of tetrahydroisoquinolines through a multicomponent reaction under solvent-free conditions†

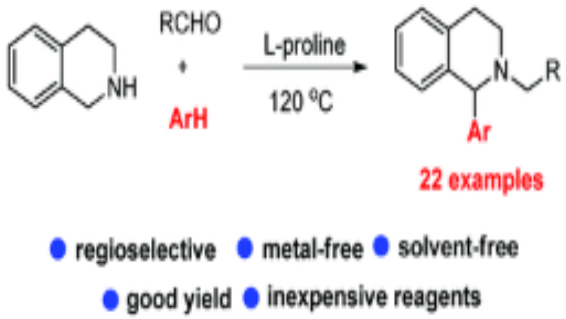
Check for updates

Iftakur Rahman,[a] Bhaskar Deka,[a] Ranjit Thakuria,[b] Mohit L. Deb *[a] and Pranjal K. Baruah *[a]

Author affiliations

Abstract

Here we disclose the C1 arylation of tetrahydroisoquinolines (THIQ) through regioselective C(sp^3)–H functionalization using a multicomponent reaction. The reaction was performed by reacting THIQ, aldehydes and aminopyrazoles or indoles under neat conditions with L-proline as a catalyst. The regioselectivity of the products was confirmed by X-ray analysis and spectroscopic data. The formation of an azomethine ylide intermediate is crucial for obtaining the regioselectivity.



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Recent Advances on the C2-Functionalization of Indole via Umpolung

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Bhaskar Deka, Mohit L. Deb & Pranjal K. Baruah

Abstract

Heterocyclic compounds having a nitrogen atom in the ring exhibit very interesting biological activities. Indole is the core structure of many bioactive compounds owing to its high affinity to bind with most biological targets. Indole is an electron-rich compound and generally prefers electrophilic rather than nucleophilic substitution. Hence, many important indole derivatives are difficult to synthesize through the conventional reactivity of indole. This limitation can be avoided by using the umpolung, from the German word meaning polarity inversion. In umpolung, the indole molecule, especially the C2 and C3 positions, behave as an electrophile. As C2-functionalized indoles have substantial importance in synthetic and pharmaceutical chemistry, this review focuses on the C2 umpolung of indoles via the indirect approach which is less explored. Unlike direct approaches of indole umpolung, indirect methods have several advantages and therefore a number of research articles have been published in this field. But no review is available up till now. This is the first review on this topic and we believe that it will surely motivate the readers to work in this area further.

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Effect of projectile breakup in the system $^{19}F + ^{154}Sm$

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An attempt was made to understand the role of various entrance channel parameters on incomplete fusion dynamics by the measurements of excitation functions of evaporation residues populated via complete and incomplete fusion dynamics in the system $^{19}F + ^{154}Sm$ at projectile energy ≈ 4-6 MeV/A. The stacked foil activation technique followed by offline gamma ray spectrometry was employed in these measurements. The measured excitation functions of various evaporation residues populated have been analyzed within the framework of statistical model code PACE-4. It has been observed that the measured excitation functions of xn and pxn emission channels agree well with the theoretical predictions of PACE-4. On the other hand, the measured excitation functions of α-emission channels have been found significantly enhanced over their theoretical predictions. This enhancement may be attributed to the incomplete fusion of the projectile ^{19}F as the calculations for incomplete fusion are not included in statistical model calculations. The incomplete fusion fraction has been deduced from the present measurements. Further, a systematic study has also been performed, which shows that the incomplete fusion increases significantly with entrance channel mass asymmetry at low projectile energy, differently for different projectiles.

Keywords: Excitation functions, Stacked foil activation technique, Complete and incomplete fusion, Incomplete fusion fraction, Entrance channel mass asymmetry

1 Introduction

The study of heavy ion induced nuclear reactions has been a subject of great interest for both experimental and theoretical nuclear physicists. Various nuclear fusion processes may take place in the collisions of heavy ions at projectile energy above the coulomb barrier. At projectile energies above coulomb barrier and below ≈10 MeV/nucleon, the complete fusion (CF) is supposed to be the dominant mode of nuclear reaction. However, a large fraction of incomplete fusion (ICF) has also been observed at these energies. In the complete fusion (CF) process, entire projectile fuses with the target and leads to the formation of highly excited compound nucleus, which further decays by evaporating light particles (neutrons, protons and α-particles) at the equilibrium stage. On the other hand, in case of ICF reactions, only a part of the projectile fuses with the target nucleus, leading to fractional transfer of momentum from the projectile to the target nucleus, while the remainder (generally α-particle) moves in the forward direction as spectator. Britt and Quinton[1] observed the first experimental evidence of ICF in the break-up of projectiles like ^{12}C, ^{14}N, and ^{16}O into α-clusters. Further, a pioneer work in the understanding of ICF dynamics was done by Inamura *et al.*[2] through the charged particle-γ coincidence measurements for $^{14}N + ^{159}Tb$ system at beam energy about ≈7 MeV/A. Apart from experimental studies, several theoretical models have also been proposed to explain the characteristic features of ICF dynamics. Some of the most widely used models to explain ICF data are the breakup fusion model[3], sum rule model[4], promptly emitted particles model[5], and exciton model[6]. These theoretical models can satisfactorily predict the contribution of ICF in some cases at projectile energy greater than 10 MeV/A. But none of these models can satisfactorily explain the gross features of ICF data at low projectile energy below 7 MeV/A. Hence, a clear understanding of the mechanism of ICF dynamics has yet to be established at low projectile energy. This makes the study of ICF dynamics still a relevant area of investigation. The contribution of low energy ICF reactions and their dependence on various entrance

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Quasi-elastic scattering measurements of the ^{28}Si + ^{142}Nd system at back-angle

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The barrier distribution of a system can be extracted from excitation function data obtained either through fusion reaction or through quasi-elastic scattering measurement. In the present work, the quasi-elastic excitation function has precisely been measured at back angle for the ^{28}Si + ^{142}Nd system at energies around the Coulomb barrier and the corresponding experimental barrier distribution has been extracted. The experimental data has been interpreted in the frame work of the coupled channel calculations which include couplings to different possible modes of excitations of the interacting target-projectile combination. The possible effect of the nature of projectile excitations on the derived barrier distribution has been presented.

Keywords: Quasi-elastic scattering, Barrier distribution, Excitation function, Target deformation, Coupled channel calculation

1 Introduction

The study of the effect of couplings to the inelastic excitations of the interacting nuclei in the fusion process at energies around the Coulomb barrier has been carried out in several investigations over the last few decades. The investigations were made for a series of target-projectile combinations having different degrees of deformations[1]. The experiments were carried out involving the fusion and quasi-elastic excitation function measurements. Several interesting results governing the underlying fusion dynamics have come out from these investigations. It is to be noted that quasi-elastic scattering process of the heavy ion projectile like particles at the backward angles is considered to be the counterpart of the corresponding heavy-ion fusion reaction between the incoming projectile and the target. Both are inclusive processes and sensitive to the channel coupling effects at energies close to the Coulomb barrier. However, a major difference between the two processes is that the quasi-elastic scattering is related to the reflection probability at the Coulomb barrier, while the fusion is related to the transmission probability. The excitation function data reveals the most fundamental features of the underlying reaction process and is very often used for extracting the other relevant observable such as the extraction of barrier distribution. It is worthwhile mentioning that the barrier distribution of a given system obtained from both the quasi-elastic scattering and fusion excitation function measurements is found to be very similar in nature. However, the quasi-elastic excitation function measurement is relatively easier to carry out from the technical point of view

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Quasielastic scattering measurements in the ^{28}Si + ^{142,150}Nd systems

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Barrier distributions for the ^{28}Si + ^{142,150}Nd systems were extracted from large-angle quasielastic scattering measurements. The measurements were carried out over a wide range of incident beam energies around the Coulomb barriers. The experimental results were compared with the predictions from coupled-channels calculations carried out using different coupling schemes. Reasonable agreement between the experimental and theoretical results was obtained. The role of coupling effects of the various excitation modes of the projectile and target on the observed barrier distributions is discussed. The sensitivity of the quasielastic scattering process on the mode of projectile excitation is clearly been seen from the use of two different types of targets, ^{142}Nd and ^{150}Nd, having spherical and deformed shapes at the ground state, respectively.

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I. INTRODUCTION

The nuclear structure effect of the participating target and projectile in the fusion process at energies around the Coulomb barrier has been addressed in several works [1–5]. This effect can usually be explained satisfactorily by taking into account the appropriate couplings of inelastic excitations and the underlying nonfusing channels between the interacting nuclei. Different kinds of nuclear excitation processes such as rotations, vibrations, particle transfer, etc., which evolve at the time of interactions can enhance the sub-barrier fusion cross sections [6–9]. These couplings also very often give rise to a distribution of fusion barriers. In the case where the coupling effect is not relevant, a single fusion barrier exists. Hence, the measurement of barrier distribution reveals the competing reaction mechanisms and the effects of nuclear structure in the fusion process. In general, the barrier distribution is extracted by the measurement of fusion cross section ($\sigma_{\rm fus}$) [10]. The feasibility of the extraction of barrier distribution from the measurements of quasielastic scattering cross sections ($\sigma_{\rm qel}$) at back angles was first proposed by Timmers *et al.* [11]. The similarity of barrier distribution patterns obtained from fusion and quasielastic scattering data for a given system was subsequently verified experimentally by several groups [12,13]. In the recent past, many experiments have been performed to measure the barrier distribution using the quasielastic scattering method [14–17]. The quasielastic scattering cross section at back angle represents the sum of the cross sections obtained from elastic, inelastic, and transfer events. Following the prescription of Timmers *et al.* [11], the barrier distribution ($D_{\rm qel}$) is obtained from the ratio between the differential scattering cross sections of quasielastic ($\sigma_{\rm qel}$) and Rutherford ($\sigma_{\rm R}$) using the following relation:

$$D_{\rm qel} = -\frac{d(d\sigma_{\rm qel}/d\sigma_{\rm R})}{dE} \quad (1)$$

The barrier distribution measurement with the quasielastic scattering method has additional advantages [18] compared to that involving the fusion method. This is due to the fact that the former method leads to comparatively smaller experimental uncertainties because only the first-order derivative of the excitation function is required [see Eq. (1)]. The present work highlights the role of the nuclear structure effect of the projectile and target on the fusion cross section through the extraction of the barrier distribution from quasielastic

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Carbon-backed thin tin (^{116}Sn) isotope target fabrication by physical vapor deposition technique

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Abstract
In nuclear reaction experiments, the thin targets are required. In the present work, 30 thin ^{116}Sn targets were prepared using physical vapor deposition technique (preferable for thin film fabrication) on carbon backing with usage efficiency of 98%. The carbon-backed thin target films along with the parting agents are deposited on the particular substrates using a diffusion pump based coating unit. The thicknesses of the targets were verified using α-energy loss and RBS technique and they were in good agreement with each other. The purity of the target, verified using RBS, EDS and XRD techniques, were also tested with confirmation.

Keywords Physical vapor deposition · Carbon-backed ^{116}Sn target · Rutherford backscattering spectroscopy · Energy dispersive X-ray spectroscopy · Thin film · X-ray diffractometer

Introduction

The nuclear reaction requires a projectile beam and the target of very good quality with uniform and small thickness, good tensile strength, good adhesion between the thin film and the substrate, low enmesh of gas and minimum contamination [1], which makes its fabrication quite arduous. For heavy ion induced nuclear reaction studies using mass analyzer, where the reaction products are separated from the beam like particles and disperses the nuclei of interest at its focal point with good mass resolution, thin self-supporting targets (few mg/cm^2 to some μg/cm^2) are called for to obtain the best results [2]. This will reduce the energy loss of projectile beam and the encapsulation of reaction products within the target. This will give clear spectrum with good segregation of various reaction products. In order to measure fusion excitation function precisely and to determine barrier distribution, small energy steps are necessary. And the energy lost by the incident beam must be lesser than the energy steps. To prepare such targets, thermal evaporation (one of the types of physical vapor deposition) is the most effective method [3, 4]. But due to difficulties in obtaining such thin self-supporting target foil (mostly for high Z elements), target materials are evaporated on a thin lower Z backing material, viz., carbon foil (≈ 30 μg/cm^2) which will minimize the energy loss and energy straggling effects of the projectile beam. Carbon remains inert with most of the metals, thereby allowing it to be the first choice as the backing material.

Different ways of fabricating Sn targets are already being carried out. Long back, Zell [5] prepared Sn (~ 1 to 2.5 mg/cm^2) target on Bi (~ 50 to 75 mg/cm^2) backing by rolling and on Cu (~ 20 mg/cm^2) backing using evaporation technique. In another case, Manente and Pengo [6] and Abhilash et al. [7] prepared self-supporting Sn (≈ 1 mg/cm^2) target using rolling techniques. Sood et al. [8] could fabricate self-supporting thin ^{116,118}Sn films (250–600 μg/cm^2) using the resistive heating method. Singh et al. [9] reported the fabrication of gold-backed Sn targets of thickness (0.5–2 mg/cm^2) using rolling technique and evaporation technique. Abhilash et al. [7] and Sharma et al. [10] prepared thin carbon backed ^{122}Sn

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Role of neutron transfer in the sub-barrier fusion cross section in $^{18}O + ^{116}Sn$

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Background: In heavy-ion-induced fusion reactions, cross sections in the sub-barrier region are enhanced compared to predictions of the one-dimensional barrier penetration model. This enhancement is often understood by invoking deformation and coupling of the relative motion with low-lying inelastic states of the reaction partners. However, effects of nucleon transfer on fusion below the barrier, especially for the systems having positive Q value neutron transfer (PQNT) channels, are yet to be disentangled completely.
Purpose: We intend to study the role of the PQNT effect on the sub-barrier fusion of the $^{18}O + ^{116}Sn$ system having positive Q value for the two-neutron stripping channel. Also we reflect on the interplay of couplings involved in the system around the Coulomb barrier.
Method: The fusion excitation function was measured at energies from 11% below to 46% above the Coulomb barrier for $^{18}O + ^{116}Sn$ using a recoil mass spectrometer, viz., the Heavy-Ion Reaction Analyser (HIRA). Fusion barrier distributions were extracted from the data. Results from the experiment were analyzed within the framework of the coupled-channels model.
Results: Fusion cross sections at energies below the Coulomb barrier showed strong enhancement compared to predictions of the one-dimensional barrier penetration model. The fusion process is influenced by couplings to the collective excitations with coupling to single- and two-phonon vibrational states of the target and the projectile respectively. Inclusion of the two-neutron transfer channel in the calculation along with these couplings could reproduce the data satisfactorily.
Conclusions: The significant role of PQNT in enhancing the sub-barrier fusion cross section for the chosen system is not observed. It simply reduced the sub-barrier fusion cross section. Therefore, a consistent link between PQNT and sub-barrier fusion enhancement could not be established vividly while comparing the fusion excitation function from this work with the same from other $^{16,18}O$-induced reactions. This clearly points to the need for more experimental as well as theoretical investigation in this field.

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I. INTRODUCTION

Intense research has been going on for the last few decades to understand the interplay between nuclear reaction dynamics and nuclear structure around the barrier [1–5]. Contrary to classical belief, in which fusion between two colliding nuclei takes place only if the incident projectile energy in the center-of-mass (c.m.) frame of reference ($E_{c.m.}$) is more than the Coulomb barrier (V_b), fusion has been found to take place even for $E_{c.m.} \lesssim V_b$. This phenomenon, modeled as the one-dimensional barrier penetration model (1D-BPM), is due to quantum tunnelling of the projectile through the barrier [1,6]. Moreover, for many systems, significant enhancement of fusion cross sections has been observed beyond the 1D-BPM predictions, near and below the Coulomb barrier [7,8].

Such enhancements in sub-barrier fusion cross sections have been attributed to coupling of the relative motion with internal degrees of freedom such as neck formation [9,10], deformation [11–13], zero point motion [14], nuclear shape vibrations [15–20], or nucleon transfer [21–25]. These couplings often lessen the barrier height by modifying the one-

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HIGHER DIMENSIONAL BIANCHI TYPE-III STRING UNIVERSE WITH BULK VISCOUS FLUID AND CONSTANT DECELERATION PARAMETER(DP)

JITEN BARO AND KANGUJAM PRIYOKUMAR SINGH[1]

Abstract. Here, we have studied a Bianchi type-III string cosmologicl model with bulk viscous fluid and negative constant DP in general relativity considering five dimensional space-time. To get the exact solutions of the survival field equations, we assume that (i) DP is a constant and negative quantity and (ii) the shear scalar and expansion scalar are proportional. Some of the most important parameters of the model are obtained and their behaviors are studied. The model universe obtained here is expanding, shear free throughout the evolution, anisotropic at late time when $n \neq 1$ and the late universe is dominated by the particles.

1. Introduction

It is now almost proved from observational and theoretical fact that the universe is expanding with acceleration from the big-bang till today. However, no one can guarantee for forever expansion because there is no final conclusion about the expansion or contraction of universe till today. From various literatures and opinions it can be belief that the acceleration of present universe may be accompanied by way of deceleration. But the precise motive of this expanding universe is not known to us till today which inspired all the cosmologists and physicists for similarly research within the area of studies on this field. In the recent past years, several models in cosmology has been proposed by different

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Key words and phrases. Cloud String, Bianchi Type-III, bulk viscous fluid, Five D. space-time.

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BULK VISCOUS FLUID BIANCHI TYPE-I STRING COSMOLOGICAL MODEL WITH NEGATIVE CONSTANT DECELERATION PARAMETER

KANGUJAM PRIYOKUMAR SINGH AND JITEN BARO[1]

ABSTRACT. Here we have studied a Bianchi Type-I string cosmological model with bulk viscous fluid and negative constant deceleration parameter in general relativity. To solve the survival field equations here we assumed that the shear scalar and scalar expansion are directly proportional to each other $\sigma \propto \theta$. The geometrical as well as physical features of the model are obtained and discussed. The model universe starts at initial epoch $t = 0$ with 0 volume and then expand with accelerated rate. The model universe obtained here is non shearing. The coefficient of bulk viscosity plays an important role in the cosmological consequences.The tension density diminishes with faster rate than particle density in the evolution of universe which shows that the present day universe is particle dominated.

1. INTRODUCTION

One of the tough problem for the researcher is to obtained the actual physical state of the universe at the very early days of its formation. Strings cosmological models are studied widely in present days due to their major contribution in the study of the evolution of the universe in early stages after the big bang. According to the grand unified theories (Everett [1], Vilenkin [2]), those strings was formed during the transition of phases when the temperature went down

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Key words and phrases. Cloud String, Bianchi Type-I, bulk viscosity, general relativity.

A new species of land snail from the genus *Diplommatina* Benson, 1849 (Gastropoda, Caenogastropoda, Diplommatinidae) from Sikkim Himalaya, North East India

Nipu Kumar Das & Neelavar Ananthram Aravind

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ABSTRACT

A new species of *Diplommatina* Benson, 1849 from Sikkim, Northeast India is described based on shell morphology. This new species is found to be distinct in its externally visible large parietal tooth, and in the absence of a columellar tooth on the shell aperture. A detailed comparison with the closest congeners of the new species is provided. *Diplommatina bidentata* Vermeulen, Liew & Schilthuizen, 2015 from Malaysia is the only morphologically similar species with a tooth on the parietal lip, but it differs from the new species in having a tooth on the columellar lip as well as other shell characters. A checklist is also given for all the described *Diplommatina* species from North East India, as well as those from Darjeeling, West Bengal.

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Articles

Redescription of *Acmella tersa* (Benson, 1853), the type species of *Acmella* W.T. Blanford, 1869 (Gastropoda: Assimineidae), from Meghalaya, Northeast India

Nipu Kumar Das, Barna Páll-Gergely, Fred Naggs, Richard C. Preece, Tom S. White & Neelavar Ananthram Aravind

Pages 324-331 | Received 12 May 2021, Published online: 14 Nov 2021

Cite this article https://doi.org/10.1080/13235818.2021.1991255 Check for updates

ABSTRACT

The type species of the assimineid genus *Acmella* W.T. Blanford, 1869 is *Cyclostoma tersum* Benson, 1853, originally described from 'Musmai' [Mawsmai], Meghalaya, Northeast India. No specimens from Benson's type series can be traced, and contemporary shells collected from the type locality in museum collections are extremely worn. It has therefore been impossible to examine shell microsculpture, an important taxonomic character in the diagnosis of species of Assimineidae, using museum specimens. In order to provide better diagnostic characters for the genus *Acmella*, we redescribe and illustrate *Acmella tersa* from newly collected specimens, one of which is designated as the neotype. We also provide a list of all known species attributed to *Acmella*.

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Wettability Transition on the Fractal Surface Developed by Size-Selected Ag Nanoclusters

Pintu Barman*, Anindita Deka, Supratic Chakraborty, and Satyaranjan Bhattacharyya

Cite this: *J. Phys. Chem. C* 2021, 125, 44, 24576−24588
Publication Date: November 1, 2021
https://doi.org/10.1021/acs.jpcc.1c06534

SUBJECTS: Cluster chemistry, Contact angle, Deposition, Ions, Thin films

Abstract

Surface morphology and wetting property of silver nanocluster-deposited films have been comprehensively investigated. A gas aggregation-type magnetron sputtering process is used to produce Ag nanoclusters, and the films are prepared by varying the cluster ion currents. The morphological result suggests that the deposited clusters agglomerate over the surface and also the overall size distribution is affected with increasing ion current. The morphological data are used to characterize various statistical parameters of the surface such as the interface width, autocorrelation function, power spectral density function, and fractal dimensions of the films. The X-ray photoelectron spectroscopy study reveals that the produced Ag nanostructures are made of pure metallic silver, and the total atomic concentration of silver on the surface increases with the increase of cluster ion currents. Wettability study of the films reveals that the morphological parameters along with the changing surface chemistry influenced the wetting property of the films. A sudden transition in surface wettability from hydrophilic to hydrophobic is observed for the films measured *via* water contact angle measurements. The comparison with the theoretical values suggests that the nanostructures produced for higher ion currents follow the Wenzel's model. Finally, a correlation between the fractal dimension and the water contact angle values has been observed.

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PAPER

Interaction of size-selected Ag-clusters on Au-thin films: a composition study with *in-situ* XPS analysis at an elevated temperature

Pintu Barman[1,2], Anindita Deka[1,2] and Satyaranjan Bhattacharyya[3,1]

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Journal of Physics D: Applied Physics, Volume 54, Number 27

Citation Pintu Barman *et al* 2021 *J. Phys. D: Appl. Phys.* 54 275301

DOI 10.1088/1361-6463/abf677

References Open science

Article and author information

Abstract

In this paper, we describe a novel method of synthesis of bimetallic Ag–Au alloy nanoparticles with an estimated Ag to Au concentration ratio of ~3:1 by using a gas-aggregation cluster source. The real time chemical changes occurred on the surface of the alloy film during different stages of annealing at an elevated temperature are observed by *in-situ* x-ray photoelectron spectroscopy analysis. It is found that the concentration of both Ag and Au of the alloy film simultaneously decreases with the increase of the annealing time. The chemical states of the elements present on the surface are analyzed from the HR-XPS data, which are recorded for the dominant elements present on the surface. From the analyses, it is found that a small part of metallic Ag gets oxidized for higher annealing time whereas no trace of oxidation of Au is observed. The surface morphology of the as-deposited and post-annealed alloy films are characterised by FESEM and AFM measurements. Due to thermal diffusion of Ag and Au, resultant narrow size distributions of the bimetallic Ag–Au nanoparticles are observed on the surface. The film morphologies suggest that the evolutions of bimetallic Ag–Au nanoparticles are nearly spherical in shape with an average aspect ratio value of ~1.5.

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Surfaces and Interfaces

Volume 25, August 2021, 101242

Transition of nano-ripple to nano-hillock pattern on ion bombarded Si with an enhanced hydrophobicity

Anindita Deka [a b], Pintu Barman [a b], M.K. Mukhopadhyay [a b] ✉, S.R. Bhattacharyya [a]

https://doi.org/10.1016/j.surfin.2021.101242 ↗

Abstract

Surface patterning in nano-scale dimension and the effect of surface heterogeneity to control surface properties like wettability of solid surfaces have been studied here. This work focuses primarily on the generation of Si nano-patterns at oblique incidence via ion beam assisted impurity co-deposition technique and its impact on the wetting property of liquid. When oblique ion irradiation is performed on a Si surface without impurity, ripple structures evolve that show an increase in its hydrophilic behavior with a rise in ion fluence. On the other hand, the inclusion of stainless steel as seeding material during bombardment brings about a noteworthy change in the surface topography with the emergence of hillocks structures over the ripple morphology. For a higher bombardment time, the Si rippled surface is seen to vanish and a transition from nano-ripple to nano-hillock pattern is witnessed. Such an unusual pattern evolution is aided by $FeSi_2$ bond which further promotes an increase in surface hydrophobicity. Contact angle measurements show directional dependence behavior having a direct influence of the anisotropic patterns synthesized here.

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Issue 36, 2021

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From the journal:
New Journal of Chemistry

Application of reduced graphene oxide-based actuators for real-time chemical sensing of liquid and vapour phase contaminants†

Check for updates

Arindom Bikash Neog,[a] Raj Kumar Gogoi,[a] Priyamjeet Deka,[b] Tukhar Jyoti Konch,[a] Barsha Rani Bora[a] and Kalyan Raidongia *[ac]

Author affiliations

Abstract

Real-time detection of contaminants dissolved in a liquid medium is critical for various technological and industrial operations. Here, we have demonstrated the possibility of employing reconstructed layered material-based responsive membranes for the *in situ* detection of chemical contaminants in the liquid phase. A bilayer membrane prepared by sequential vacuum filtration of reduced graphene oxide (r-GO) and agar (r-GO/agar) displayed remarkable responsiveness towards the presence of solvent vapours in their surrounding atmosphere. The shape-morphing property of the r-GO/agar membrane is attributed to unequal changes in the mechanical properties of the individual components. Rectangular strips of the bilayer membrane also displayed shape-transforming properties inside the liquid medium. Depending upon the chemical nature of the molecules, inside the liquid medium, the strips of r-GO/agar membrane bend at a definite speed to adopt a coil-like shape. The original shape of the strip is easily recovered after dipping in water or drying in air. The bending angle and the response time of the r-GO/agar strips were found to be sensitive towards trace amounts of impurities present in the solvent system, which can be exploited for the detection of contaminants in the liquid phase, like trace amounts of water molecules dissolved in acetone or different alcohol molecules dissolved in toluene.

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ORIGINAL RESEARCH article

Front. Astron. Space Sci., 16 November 2021

Sec. Cosmology

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Higher Dimensional Bianchi Type-I Cosmological Models With Massive String in General Relativity

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Here we studied Bianchi type-I cosmological models with massive strings in general relativity in five dimensional space time. Out of the two different cases obtained here, one case leads to a five dimensional Bianchi type-I string cosmological model in general relativity while the other yields the vacuum Universe in general relativity in five dimensional space time. The physical and geometrical properties of the model Universe are studied and compared with the present day's observational findings. It is observed that our model is anisotropic, expanding, shearing, and decelerates at an early stage and then accelerates at a later time. The model expands along x, y, and z axes and the extra dimension contracts and becomes unobservable at $t \to \infty$. We also observed that the sum of the energy density (ρ) and the string tension density (λ) vanishes ($\rho + \lambda = 0$).

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Indian Journal of Science and Technology

DOI: 10.17485/IJST/v14i16.240

Year: 2021, **Volume**: 14, **Issue**: 16, **Pages**: 1239-1249

Original Article

Higher Dimensional LRS Bianchi Type-I String Cosmological Model with Bulk Viscosity in General Relativity

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ABSTRACT

Objective: To present a new solution to the field equations obtained for higher dimensional LRS Bianchi type-I universe generated by means of a cloud of strings with particles connected to them with bulk viscosity in general relativity. **Methods:** To obtain the solutions of field equations of higher dimensional LRS Bianchi type-I universe we consider that the shear scalar of the model is proportional to the scalar expansion of the model (saq), which leads to, c=b^n. The physical and geometrical behaviors of the model universe are studied by comparing with the present cosmological scenario and observations. **Findings:** It is observed that our model is anisotropic, expanding and decelerates at early stage and then accelerates in late universe giving the inflation model universe. **Noveltv:** We obtained new solution to the field equations

Indian Journal of Science and Technology

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Year: 2021, **Volume**: 14, **Issue**: 1, **Pages**: 46-54

Original Article

Mathematical analysis on anisotropic Bianchi Type-III inflationary string Cosmological models in Lyra geometry

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ABSTRACT

Objectives: To present a new solution to the field equations obtained for Bianchi type-III universe by using the law of variation of H, which yields constant DP. **Methods:** We study a Bianchi type-III cosmological model with a cloud strings with particles connected to them in Lyra geometry. To find the exact solutions of survival field equations we consider here that the shear scalar and scalar expansion are proportional to each other (saq) that leads to the equation b = cm and secondly we adopt the assumption considering the Deceleration Parameter q as a negative constant quantity giving the inflationary model. The geometrical and physical properties are studied and compared with the recent observational data. **Findings:** The present model starts at t=0 with 0 volume and as time progresses it expands with accelerated rate and the model shows that the present universe is particle dominated.

Available online at http://scik.org

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HIGHER DIMENSIONAL PERFECT FLUID COSMOLOGICAL MODEL IN GENERAL RELATIVITY WITH QUADRATIC EQUATION OF STATE (EoS)

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Abstract: Higher dimensional Bianchi type-V cosmological model in the general theory of relativity with quadratic equation of state interacting with perfect fluid has been studied. For higher dimensional Bianchi type-V space time, the general solutions of the Einstein's field equations have been obtained under the assumption of quadratic equation of state (EoS) $p = \alpha\rho^2 - \rho$, where $\alpha \neq 0$ is arbitrary constant. The physical and geometrical aspects of the model are discussed.

Keywords: higher dimensions; Bianchi type-V; perfect fluid; quadratic EoS.

2010 AMS Subject Classification: 85A40, 58D30, 83F05.

1. INTRODUCTION

It is now almost proved from theoretical and astronomical observations such as type Ia supernovae (Riess et al. [1], Perlmutter et al. [2], Riess et al. [3]) that the universe is expanding

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REDESCRIPTION AND RANGE EXTENSION OF TWO CARNIVOROUS MICRO-SNAIL SPECIES OF THE GENUS *SINOENNEA* (GASTROPODA: STREPTAXOIDEA: DIAPHERIDAE) FROM NORTHEAST INDIA

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Abstract *This paper provides new records and redescribes two carnivorous micro snail species, viz., Sinoennea austeni (Peile, 1929) and Sinoennea vara (Benson, 1859), belonging to the family Diapheridae. Redescriptions are based on shell morphology and include ecological notes and new localities including the first record of S. austeni in 92 years. While Sinoennea austeni is endemic to Northeast India, S. vara has been recorded from Bhutan and Northeast India.*

Key words *Shell morphology, taxonomy, hotspot, land snail, carnivorous snail, ecology, Mizoram*

INTRODUCTION

Members of the carnivorous land snail genus *Sinoennea* Kobelt, 1904 (family Diapheridae) are widely distributed from northeast India, Nepal to northern Borneo in the south and Japan in the east (Budha *et al.*, 2015; Páll-Gergely *et al.*, 2020). There are over 80 species reported from this genus to date (www.molluscabase.org, Páll-Gergely *et al.*, 2020). The shells of *Sinoennea* range mostly between 2 and 12mm in size and are cylindrical to ovoid in shape. The most important conchological characteristics to identify them are the density of ribs and the morphology of apertural barriers. In India, there are eight species of *Sinoennea*, of which seven were described from northeast India, while the remaining one was described from Nicobar Island (Table 1). Known species of *Sinoennea* were found to be associated with different habitats, including forests with calcium-rich soils (Vermeulen, 2007), limestone hills (Maassen, 1999; Tanmuanggpak *et al.*, 2015), limestone caves (Maassen, 1999; Dumrongrojwattana and Wongkamhaeng, 2013). Thus, although these snails are not obligate rock-dwellers, they are quite abundant in calcium-rich soils.

Initially, Kobelt (1904) erected the genus *Sinoennea* based on the shell morphology, mainly aperture features, followed by *Indoennea* Kobelt, 1904. However, Peile (1935) synonymized them based on the close similarity in the shell and aperture (shape, folds arrangement) between type species of *Indoennea* with *Sinoennea*. Formerly, the genus *Sinoennea* was placed within the family Streptaxidae, however, Sutcharit *et al.* (2010) erected the family Diapheridae based on integrative taxonomy involving shell morphology, reproductive anatomy and molecular data and placed *Sinoennea* therein. However, so far, no morphological synapomorphies of the Diapheridae are known. In this paper we redescribe two poorly known species of *Sinoennea* from northeast India, *S. austeni* (Peile, 1929) and *S. vara* (Benson, 1859) and provide ecological notes along with new distribution data for these species.

MATERIAL AND METHODS

Samples were collected across Mizo hills, including the Blue Mountain range, located in south-eastern parts of Mizoram, Northeast India, in January 2019 (Fig. 1). The current collection was part of a large project entitled "Bioresources and Sustainability Livelihood of Northeast India" (http://nebiores.atree.org/) on the inventory of the biodiversity of the Northeastern states of

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Influence of metal codeposition on the growth and orientation of nanoripple structure during ion bombardment

Anindita Deka, Pintu Barman, M. K. Mukhopadhyay, and S. R. Bhattacharyya
Phys. Rev. B **105**, 195437 – Published 31 May 2022

Article | References | No Citing Articles | PDF | HTML | Export Citation

ABSTRACT

Surface engineering to tune the surface characteristics for the enhancement of a system is an emerging area of research in terms of its immense technological applications and basic scientific understanding. The ion beam sputtering technique in combination with cosputtered material deposition to form various structures is found to be a very effective bottom-up approach to modify the surface morphology of a material. In this paper, a theoretical model is developed for ripple evolution of a flat elemental surface which is subjected to erosion by ion bombardment at off-normal incidence with concurrent deposition of some impurity or foreign materials. The orientation of the ripple wave vector thus produced exhibits a directional dependence behavior on the projection of both the ion beam and the foreign elements on the surface. The compound formation at the near-surface depth is considered to be the key assumption for inducing such patterns on the surface. The theoretical prediction is realized in the experimental work demonstrated herein. Stainless steel is used as a cosputtering target during irradiation of Si at 30° incidence by a low-energy Ar^+ ion beam. The ripples that so emerge possess a wave vector lying oblique to the direction of the ion beam and impurity. The development of such morphological instability is attributed to the reaction between Fe and Si, which gives rise to a compound with an erosion rate lower than that of Si. Thus, the formation of the $FeSi_2$ bond, which is interpreted as being a crucial criterion for pattern evolution, agrees well with the theory, making it quite efficient and widely acceptable.

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Separation and Purification Technology
Volume 301, 15 November 2022, 122049

Fluorinated graphene nanosheet supported halloysite nanoarchitectonics: Super-wetting coatings for efficient and recyclable oil sorption

Iniya Prasanthi [a], Barsha Rani Bora [b], Kalyan Raidongia [b], K.K.R. Datta [a]

https://doi.org/10.1016/j.seppur.2022.122049

Highlights

- Hydrophobic-superoleophilic HNTC (1D)-FG (2D) hybrids integrated 3D (PU) sponge.
- Oil/sea-water separation using FG-HNTC nanoarchitectonics.
- FG-HNTC-PU sponges exhibit excellent physical and chemical stabilities.
- Oil sorption capacity ranging from 38 to 62 g/g under static and turbulent conditions.
- Continuous organics separation by FG-HNTC-PU fixed to pump across multi-cycle.

ASIAN JOURNAL OF ORGANIC CHEMISTRY

ACES Asian Chemical Editorial Society

Research Article

Iodine-DMSO-Promoted Oxygenation of Indoles: Synthesis of Isatin and Isoindigo

Gaurav K. Rastogi, Dr. Bhaskar Deka, Dr. Mohit L. Deb, Dr. Pranjal K. Baruah

First published: 09 February 2022 | https://doi.org/10.1002/ajoc.202100757 | Citations: 3

Abstract

Oxygenation/oxidative self-coupling of indole are performed to obtain isatin and isoindigo in the absence of metal catalysts. Iodine-DMSO is used to synthesize isatin whereas Iodine-DMSO-$K_2S_2O_8$ combination is used for isoindigo synthesis directly from indole in a single step. Though several methods are known for isatin synthesis from indole, most of them use large quantity of oxidants or metal catalyzed. Moreover, the primary existing process for the synthesis of isoindigo is the condensation of isatin and oxindole in the presence of an acid catalyst. But this method provides isoindigo derivatives directly from indoles. A plausible mechanism is also proposed based on the various control experiments which indicate that both the reactions proceed *via* radical route. It is also observed that oxygen atoms of isatin and isoindigo come from water molecule and DMSO.

Ten Years of Glory in the α–Functionalizations of Acetophenones: Progress Through Kornblum Oxidation and C–H Functionalization

Review | Published: 08 November 2021

Volume 380, article number 1, (2022) Cite this article

Bhaskar Deka, Gaurav K. Rastogi, Mohit L. Deb & Pranjal K. Baruah

Abstract

This review article focuses on the α-functionalization of acetophenones involving Kornblum oxidation and C–H functionalizations. Although various other strategies, such as classical approaches, enamine approaches and umpolung strategy are also known for this functionalization, here we discuss mainly the Kornblum oxidation approach and C–H functionalization strategy as they have advantages over the others. In Kornblum oxidation, the reaction uses iodine and dimethylsulfoxide and proceeds through the formation of arylglyoxal as the key intermediate. In C–H functionalization, the reaction requires metal, or metal-free catalyst, and generates radical intermediate in most cases. α-Functionalization of acetophenones is very important because of their huge applications in the synthesis of various natural products and pharmaceuticals and, therefore, a number of research articles have been published in this area. However, no review articles are available so far. In this article, we present a succinct discussion of various important and novel reactions, along with their mechanisms, published since 2012 to date. We believe that this first review article in this field will give readers one-stop information on this topic and encourage further intriguing work in this area.

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IOP Publishing Journal of Physics G: Nuclear and Particle Physics
J. Phys. G: Nucl. Part. Phys. 49 (2022) 035103 (11pp) https://doi.org/10.1088/1361-6471/ac4b0f

Inference on fission timescale from neutron multiplicity measurement in $^{18}O + ^{184}W$

N K Rai[1,8], A Gandhi[1], M T Senthil Kannan[2], S K Roy[2], N Saneesh[3], M Kumar[3], G Kaur[3], D Arora[3], K S Golda[3], A Jhingan[3], P Sugathan[3], T K Ghosh[2], Jhilam Sadhukhan[2], B K Nayak[4,9], Nabendu K Deb[5], Saumyajit Biswas[6], A Chakraborty[6], A Parihari[7] and Ajay Kumar[1,*]

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Abstract

The pre-scission and post-scission neutron multiplicities are measured for the $^{18}O + ^{184}W$ reaction in the excitation energy range of 67.23–76.37 MeV. Langevin dynamical calculations are performed to infer the energy dependence of fission decay time in compliance with the measured neutron multiplicities. Different models for nuclear dissipation are employed for this purpose. Fission process is usually expected to be faster at a higher beam energy. However, we found an enhancement in the average fission time as the incident beam energy increases. It happens because a higher excitation energy helps more neutrons to evaporate that eventually stabilizes the system against fission. The competition between fission and neutron evaporation delicately depends on the available excitation energy and it is explained here with the help of the partial

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PHYSICAL REVIEW C **105**, 054608 (2022)

Investigation of isotopic dependence on the O + Ni fusion cross section near barrier energies

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(Received 8 December 2021; accepted 28 April 2022; published 19 May 2022)

Fusion excitation functions have been measured for $^{16}O + {}^{61}Ni$ and $^{18}O + {}^{61,62}Ni$ systems around the Coulomb barrier ($\approx 0.7V_B$–$1.3V_B$) using the recoil mass spectrometer, heavy ion reaction analyzer. The ground state Q value for two neutron stripping is positive for both systems with ^{18}O as the projectile. Strong enhancement of the experimental fusion cross sections were observed below the barrier for all the systems compared to that of the predictions of the one-dimensional barrier penetration model. To understand such enhancement, a coupled-channels formalism has been used. A comparative study of these systems indicated that the coupling of two neutron transfer channels with the collective excitations could play the role behind the sub-barrier fusion enhancement for ^{18}O induced reactions. However, the sub-barrier enhancement for $^{16}O + {}^{61}Ni$ is found to be due to the coupling of quadrupole vibrations of both the interacting nuclei. Also after comparing these systems with other systems of different Ni isotopes, we have found that the signature of the role of coupling to neutron transfer channels due to ground state positive Q value for neutron transfer is ambiguous.

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I. INTRODUCTION

Enhancement in the sub-barrier fusion cross section, in comparison with the predictions of the one-dimensional barrier penetration model (1DBPM), is observed for many systems in the last few decades, owing to the advent of many experimental facilities and techniques [1–3]. The reason ascribed for such enhancement is the coupling of various intrinsic degrees of freedom which governs the fusion dynamics near the Coulomb barrier (V_B) [4–6]. Such couplings like relative motion to the degree of freedom associated with inelastic collective excitations and nucleon transfers modifies the tunneling process vigorously, thereby leading to broadening of spin distributions of compound nuclei, splitting of single barrier into manifold barrier, etc. In the coupled channel (CC) framework, coupling to the inelastic excitations in near barrier is well described [7,8]. Such CC calculations could reproduce the experimental data correctly for most of the systems. However, there are many experimental proofs which attribute the neutron transfer with positive Q values for the additional observed enhancement of the sub-barrier fusion cross section, as such enhancement could not be reproduced by CC calculations without considering neutron transfer [9–12]. Contrary to these observations, there are certain systems in which the role of positive Q value neutron transfer channels is found to be negligible in the sub-barrier fusion [13,14]. Such ambiguity in observations indicates the importance of describing the sub-barrier fusion enhancement in terms of the coupling of neutron transfer channels. The theoretical model correctly predicting such enhancement due to neutron transfer is yet to be made available.

The possible transfer reaction influence was observed on the sub-barrier cross sections of Ni + Ni fusion reactions [15]. Following this study, many experiments were performed on different systems, especially the systems having positive ground state Q value neutron transfer channels as they would give rise to a barrier in the lower energy regime compared to that of inelastic couplings [16], and an effort has also been made to separate the few nucleons transfer effect on the fusion process.

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Effects of entrance channels on breakup fusion induced by ^{19}F projectiles

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The study of breakup fusion of ^{19}F with ^{154}Sm target was studied through offline γ ray spectrometry. Partial cross sections of evaporation residues produced in this reaction were measured in center-of-mass energies ranging ≈3–30 MeV above the fusion barrier. The excitation functions of the evaporation residues populated through xn/pxn channels were found to be satisfactorily reproduced by statistical model calculations, whereas for the α emitting channels the cross sections show an enhancement over the theoretical predictions. The critical angular momentum deduced from the measured cross sections was found to be in good agreement with statistical model calculations. The degree of fusion incompleteness in the ^{19}F + ^{154}Sm reaction is estimated by comparing the fusion excitation functions with coupled channels calculations and the extracted fusion function with the universal fusion function. The large cross sections observed for incomplete fusion products support the interpretation that this suppression of fusion is caused by ^{19}F breaking up into charged fragments before reaching the fusion barrier. The incomplete fusion probability was also found to increase with the reduced mass and charge of the entrance channel, indicating the influence of entrance channel mass asymmetry and Coulomb repulsion on incomplete fusion. The present analysis shows the presence of strong clustering in the ^{19}F projectile as α and ^{15}N.

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I. INTRODUCTION

The characteristics of α cluster states in heavy ions (HIs) are very important for understanding nuclear processes in stars. For energies far below the Coulomb barrier (of astrophysical interest), very small cross sections cannot be measured in laboratories. The details of the interaction between the cluster and regular states must be known for the deduction of such cross sections, since strong α cluster states can increase the α width to states that are closer to the region of astrophysical interest through configuration mixing [1]. In general, the $N = Z$, even-even nuclei such as ^{8}Be, ^{12}C, ^{16}O, and ^{20}Ne are associated with strong clustering. It has proved to be far more difficult to study clustering phenomena in $N \neq Z$ nuclei because the "extra" nucleons introduce additional degrees of freedom [2,3]. The α decay threshold is usually lower in energy than the nucleon decay threshold in even-even $N = Z$ nuclei. However, for $N \neq Z$ nuclei the energy thresholds for neutron and α decay are close. The closeness of the decay thresholds for $N \neq Z$ nuclei may provide new insight to understand the interplay between the single-particle and cluster degrees of freedom. At present, data on the α cluster states in $N \neq Z$ nuclei (like ^{19}F, ^{21}Ne, etc.) are scarce due to complications in experiments and data analysis [4]. As such, the spectroscopy of ^{19}F is of interest for nuclear astrophysics and nuclear structure [5]. In astrophysics, fluorine and the reactions producing and destroying it play a key role in constraining models of stars in different evolutionary stages, such as the asymptotic giant branch (AGB) stars, responsible of the production of about half of the elements heavier than Fe [6]. In nuclear structure, ^{19}F has been subject to investigations [7] aiming at the identification of α and more exotic cluster structures. Also, its spectroscopy is very useful to constrain the nuclear properties of the ^{19}Ne mirror nucleus.

Several studies existing in the literature [8–11] show that there is a significant contribution of incomplete fusion (ICF)

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Subsisting oxidizing material and parting agent selection in the fabrication of nuclear target

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ABSTRACT

In order to perform certain heavy ion nuclear reaction experiments, the enriched targets of stable isotopes ^{61,62}Ni, ^{116}Sn, ^{144,154}Sm and ^{142,148}Nd have been fabricated by adapting physical vapour deposition technique at IUAC, New Delhi using a high vacuum evaporation chamber facility. Target materials are evaporated on a thin lower Z backing material. Fabrication of targets of materials which get readily oxidized poses lot of challenges. To avoid oxidation, appropriate capping along with backing is provided. To avoid contamination in the target, environmental condition and the proper selection of parting agent is also important. Role of encapsulation in minimizing the oxidation and the contamination level from parting agents in the targets is reported in this work. The thicknesses of the targets are verified using profilometer, α-energy loss technique. The purity of the fabricated targets is confirmed using RBS technique.

Selection and peer-review under responsibility of the scientific committee of the XII th Biennial National Conference of Physics Academy of North East (PANE 2021).

1. Introduction

Nuclear reaction studies require a good quality and homogeneous target with uniform thicknesses [1], which poses an ardent challenge during its fabrication. To study heavy-ion induced nuclear reactions with ^{61,62}Ni and ^{116}Sn elements using mass analyzer, where the reaction products of different masses are dispersed at its focal point with good mass resolution, thin self-supporting targets are preferred. To measure Fusion Excitation Function [2,3] and to study the role of various entrance channel parameters viz., mass-asymmetry of the system, target deformation etc. on the incomplete fusion dynamics [4]; a series of experiments were to be done to perform excitation functions and Forward Recoil Range Distribution (FRRD) measurements using the alpha and non-alpha clusters ion beam with enriched ^{144,154}Sm and ^{142,148}Nd targets. Through these measurements, a systematic study of low-energy fusion in these systems will be carried out to observe the effect of target deformation on incomplete fusion dynamics and hence a comparative analysis will be carried out. The Sm and Nd isotopes that are considered here consist of the pair of both deformed and spherical nuclei. The measurements with these systems are yet to be done which will contribute in the development of a theoretical model to explain incomplete fusion dynamics which is still an unresolved area of investigation [4]. Thermal evaporation techniques or resistive heating methods are the most effective methods to obtain such thin self-supporting targets [5]. But due to certain experimental limitations, target materials are evaporated on a thin lower Z backing material (e.g. carbon) foil (≈ 30 μg/cm^2) through which the energy loss and

Abbreviations: FRRD, Forward Recoil Range Distribution; IUAC, Inter University Accelerator Center; TD, Thermal deposition; DPU, Diffusion Pump based coating Unit; TPU, TurboPump based coating Unit; LN, Liquid Nitrogen; e-gun, electron gun; SRIM, The Stopping and Range of Ions in Matter; RBS, Rutherford Back Scattering; RUMP, RBS Universal Master Package; ER, Evaporation Residue; TOF, Time-of-Flight.

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Observation on the Role of Bulk Viscosity in Present Scenario of the Evolution in FRW Model Universe

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Abstract

In this paper, we have investigated the role of bulk viscosity in present scenario of the evolution in FRW model universe in the framework of Lyra's geometry. We derived the field equations when the source for energy-momentum tensor is composed of a bulk viscous fluid with cosmic strings. The Einstein's field equations are solved by assuming a constant deceleration parameter. In this work, the displacement vector is considered to be a function of time. The kinematic and physical properties of the model are also discussed by using some acceptable physical assumptions of scale factor for flat, open, and closed universe.

Keywords: FRW, Lyra Geometry, Bulk Viscous Fluid, Cosmic Strings, Deceleration Parameter

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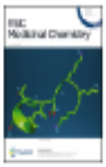

From the journal:
RSC Medicinal Chemistry

Copper chelating cyclic peptidomimetic inhibits Aβ fibrillogenesis†

Check for updates

Sujan Kalita, [a] Sourav Kalita, [a] Altaf Hussain Kawa, [a] Sukesh Shill, [a] Anjali Gupta, [b] Sachin Kumar [b] and Bhubaneswar Mandal *[a]

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Abstract

Misfolding of the amyloid-β peptide (Aβ) and its subsequent aggregation into toxic oligomers is one of the leading causes of Alzheimer's disease (AD). As a therapeutic approach, cyclic peptides have been modified in many ways and developed as a potential class of amyloid aggregation inhibitors. Head-to-tail cyclic peptides with alternating D, L amino acids inhibit amyloid aggregation significantly. On the other hand, excess deposition of copper, iron, and zinc enhances amyloid aggregation. Dysregulation of these metal ions in the brain triggers aggregation by binding to the Aβ peptide. Therefore, specific metal chelators have been developed for disrupting the Aβ-metal complex, thereby reducing toxicity and restoring metal ion homeostasis. Herein, we report the development of a head-to-tail cyclic peptidomimetic with a copper chelating ligand attached. The designed peptidomimetic inhibits amyloid aggregation significantly in a two-fold molar ratio to the Aβ peptide, as confirmed by the thioflavin T (ThT) fluorescence assay, dynamic light scattering (DLS), transmission electron microscopy (TEM), and Congo-red stained birefringence studies. The chelating ligand attached to the cyclic peptide binds efficiently to Cu^{2+} but weakly to Zn^{2+} and Fe^{2+}, thereby exhibiting profound selectivity, probed using UV-visible spectroscopy, thioflavin T (ThT) fluorescence assay, tyrosine (TYR10) fluorescence assay, isothermal titration calorimetry (ITC) and transmission electron microscopy (TEM). The non-toxicity of the designed peptidomimetics and their ability to reduce aggregating Aβ-fragment induced

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Global freshwater mollusc invasion: pathways, potential distribution, and niche shift

INVASIVE FRESHWATER MOLLUSCS | Published: 26 July 2023

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Biswa Bhusana Mahapatra, Nipu Kumar Das, Anushree Jadhav, Abhisikta Roy & Neelavar Ananthram Aravind

Abstract

Molluscs are the second largest and most speciose invertebrate phylum after Arthropoda. There are around 7000 freshwater molluscs that play an important role in the ecosystem. Although many of these freshwater species are very restricted in their habitats, due to the increase in globalisation, trade, and transport, freshwater molluscs get introduced to new environments, becoming problematic to the native biodiversity and humans. Our compilation reveals 28 invasive freshwater molluscs globally, which reportedly cause serious problems to the native biodiversity, including economic loss, agriculture, and others. The major pathways of introduction for the freshwater molluscs are found to be accidental/unintentional (e.g. as hitchhikers with macrophytes, ballast water, aquarium waste disposal) and pet trade. We obtained the distribution records for 28 species from global databases like Global Biodiversity Information Facility (GBIF), iNaturalist, and the published and grey literature. The species distribution modelling reveals Europe, South America, and Eastern North America as the most vulnerable regions. Niche dynamics analysis shows 14 species with lower and nine species with high niche overlap across the native and introduced ranges. Two species i.e. *Corbicula fluminea* and *Physella acuta* follow niche conservatism.

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Snails on the plate: Edible freshwater molluscs of Northeast India

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In many parts of the world, freshwater molluscs are extensively harvested for food and medicine. Northeast India is one such region where freshwater molluscs are consumed by the tribal and economically impoverished communities. These molluscs are in high demand as they are a cheap source of protein and provide food security, livelihoods and medicine. Although there are studies that show the nutritional and mineral value of snails, data on the details of harvest, the number of species consumed, and traditional knowledge associated with them are lacking. This is the first comprehensive study documenting the diversity of freshwater molluscs sold, quantity, location of harvest, associated traditional knowledge and uses among different tribal communities of Northeast India. The information was gathered through market surveys and informal interaction with the vendors selling molluscs. Eighteen species of freshwater molluscs belonging to five families and six genera were recorded from our study. DNA barcode analysis using COI marker for the market collected specimens of *Pulmonata* and *Brotia* show six species each from these genera. Most edible freshwater molluscs have incorrect taxonomic status and are Data Deficient or Least Concern. Therefore, it is essential to document for their conservation and management. We also advocate snail farming for their conservation and the nutritional and food security of the tribal communities, which will help in the sustainable use of natural resources.

Keywords: Conservation, Ethnozoology, Gastropods, Livelihoods, Tribes

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Molluscs are soft-bodied invertebrate organisms found in terrestrial, freshwater and marine habitats and are essential components of the ecosystem. Among many uses, the bioresource value of molluscs has gained importance in recent times, which is also beneficial for the socio-economical aspect of the local communities. Traditional knowledge regarding various uses of molluscs, including food and medicine, has also contributed significantly to exploring its potential in scientific research. Historically, molluscs have been consumed as a source of food and have been important in terms of dietary inputs. They also have been serving as a rich nutrient source since the existence of hunter-gatherer societies[1]. The most primitive record of using molluscs as food dates back to the Late Pleistocene and Holocene eras in Benidorm and Malaga of Spain, wherein land snail, *Iberus alonensis* was consumed[2,3]. Thus, molluscs have played a significant role in providing rich and nutritious food to hunter-gatherer societies[4,5]. Even today, the molluscs are considered a delicacy in many European countries[4-6], as well as in the Mediterranean, Asia and Africa[7-10]. For example, snail caviar (snail eggs) is a luxury food item that is highly popular across Europe[10]. Snail farming, also known as heliciculture, is an emerging activity in Europe and Southeast Asian countries for consumption and to obtain snail slime, a component in cosmetics. However, in both underdeveloped and developed parts of the world, wild populations of freshwater molluscs (snails and clams) are extensively harvested and consumed as a cheap source of protein by economically and socially marginalised communities.

India too has a long history of consuming snails in the coastal and inland tribal communities. Freshwater snails belonging to the genus *Pila* are known to be consumed for food as well as for medicinal purposes in various parts of India, but more frequently in Northeast (NE) Indian states[11-13]. Freshwater

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String Cosmological Model in 5-Dimensional Space-Time: Interacting with viscous Fluid

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Abstract

Considering bulk viscosity as (i) constant quantity and (ii) functions of cosmic time, the field equations in 5-dimensional Bianchi type-I model in the context of general theory of relativity, has been obtained and solved in this paper by the use of certain physical assumptions, which are agreeing with the present observational findings. In both cases, the model represents an exponentially expanding and accelerating Universe that starts with volume 0 and stops with infinite volume. The model has an initial singularity and will eventually approach the de-Sitter phase ( ). It also satisfies the energy conditions and . This model represents a matter-dominated Universe that agrees with current observational data. The model is anisotropic one and shearing throughout its evolution for .

Considering bulk viscosity as (i) constant quantity and (ii) functions of cosmic time, the field equations in 5-dimensional Bianchi type-I model in the context of general theory of relativity, has been obtained and solved in this paper by the use of certain physical assumptions, which are agreeing with the present observational findings. In both cases, the model represents an exponentially expanding and accelerating Universe that starts with volume 0 and stops with infinite volume. The model has an initial singularity and will eventually approach the de-Sitter phase ( ). It also satisfies the energy conditions and . This model represents a matter-dominated Universe that agrees with current observational data. The model is anisotropic one and shearing throughout its evolution for .

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Disentangling fractional momentum transfer in the $^{19}F + ^{154}Sm$ system

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Forward recoil range distributions of evaporation residues produced in the system $^{19}F + ^{154}Sm$ were measured at projectile energy ≈107 MeV using the offline γ-ray activation technique. The entire and fractional linear momentum transfers inferred from these recoil range distributions were used to identify the evaporation residues formed by complete and incomplete fusion mechanisms. The forward recoil range distributions of measured evaporation residues populated through xn/pxn channels were found to be consisting of a single peak only while the evaporation residues populated through α emitting channel had contributions from incomplete fusion also. The observed incomplete fusion process in the population of α emitting channel residues is explained through the breakup fusion model. The results indicate the occurrence of incomplete fusion involving the breakup of ^{19}F into $^{4}He + ^{15}N$ and/or $^{8}Be + ^{11}B$ followed by fusion of one of the fragments with target nucleus ^{154}Sm. From these measurements, the relative contributions of complete and incomplete fusion were separated out. The forward recoil range distributions data show that the incomplete fusion contribution in the fusion of fragment ^{15}N is more dominant as compared to the fusion of fragment ^{11}B with ^{154}Sm target due to the smaller value of α breakup threshold energy ($E^{\alpha}_{th,11}$). The measured forward recoil range distributions of evaporation residues produced through α emitting channels provide experimental signature of strong clustering in ^{19}F projectile as α and ^{15}N. The incomplete fusion strength function has also been deduced from the measured recoil range distributions and found to be compatible with those deduced from the measured excitation functions for the same system and beam energy.

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I. INTRODUCTION

The mechanisms of heavy-ion nuclear reactions on medium-mass targets have been studied for many years. The dominant process is generally complete fusion (CF), in which the incident projectile completely amalgamates with the target nucleus, forming an excited compound nucleus from which particles are subsequently evaporated. However, it has become increasingly apparent that in many cases there are significant contributions from incomplete-fusion (ICF) processes, in which only part of the projectile fuses with the target nucleus to give an excited intermediate composite system [1]. The role of deformation in heavy-ion fusion is important in understanding the fusion dynamics [2,3]. The fusion barrier distributions are influenced by deformation in fusion reactions involving deformed nuclei [4,5]. The fusion of light deformed projectile nuclei with a heavy collision partner modifies the fusion barrier distribution, which hinders the sub-barrier fusion cross section [6]. The influence of hexadecapole deformation on production cross sections of superheavy nuclei are also studied in the literature [7]. It has also been observed that the fusion barriers are reduced by induced nuclear deformations [8]. The influence of nuclear deformation on the fusion mechanism has been the object of various investigations, including the fusion barrier distribution [4,9]. The nuclear deformation may initiate the quasifission, thereby inhibiting fusion [4]. Nuclear shapes and deformation influences quasifission and fusion-fission process. It has been observed that the collisions with the tips of the deformed target nucleus lead to quasifission. However, collisions with the sides of the deformed target nucleus lead to fusion-fission [10,11]. Entrance

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Research

Breakup Fusion of ^{18}O with ^{144}Sm

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Abstract

Excitation function measurements have been done for the evaporation residues populating in the system $^{18}O + ^{144}Sm$. For this purpose, the stacked foil activation technique has been used subsequently accompanied by offline γ-ray spectrometry. The analysis of the experimental cross section of three evaporation residues ^{158}Tm (p3n), ^{157}Tm(p4n), and ^{155}Ho(ap2n) has been donein the light of theoretical code PACE-4. Current findings demonstrate that the experimental cross sections of evaporation residues formed via xn and pxn-emission channels follow the PACE-4 predictions, confirming that these evaporation residues are produced exclusively by complete fusion. Similarly, the cross sections of the evaporation residues generated via α-emission pathways exhibit notable enhancement in contrast to the code predictions. The increase in cross sections seen can be credited to the fragmentation of the projectile ^{18}O resulting in incomplete fusion. It has also been observed that there is a likelihood for the projectile to experience fragmentation i.e., ^{18}O into ^{14}C+ α increases as the energy of the projectile increases.

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Keywords: Heavy ion, Coulomb barrier, CF and ICF, CCFULL, PACE-4

INTRODUCTION

It has always been a primary focus of research to extensively examine the Heavy Ion (HI) produced fusion reaction [1] because it facilitates research into the properties of nuclei far from the β-stability line. In a nuclear fusion reaction, when the energy of the projectile exceeds the coulomb barrier of the system then complete fusion (CF) is anticipated to be the dominant reaction. However, recent investigations [1–3] show the distinct contribution of the incomplete fusion (ICF) phenomena. During the CF process, the projectile and the target nucleus merge completely, resulting in the formation of an energized compound nucleus (CN). The projectile transfers all of its momentum to the target. In contrast, the projectile disintegrates into its

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Full Length Article

Fabrication and characterization of CaF_2 target for multi-nucleon transfer reaction studies

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Thermal evaporation
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X-ray diffraction
Alpha energy loss thickness measurement
Nuclear transfer reaction
General purpose scattering chamber

ABSTRACT

Thin CaF_2 targets with carbon backing are fabricated for the first time using physical vapour deposition technique at the target laboratory of IUAC, New Delhi to perform a multi nucleon transfer reaction on $^{112,124}Sn+^{48}Ca$ systems using General Purpose Scattering Chamber (GPSC) facility. Ca being an oxidizing material, we have used molecular CaF_2 as the target material instead of Ca. Using turbo-molecular pump based coating unit (TMPU), carbon is deposited on cleaned glass slide and then CaF_2 is deposited on diffusion pump based coating unit (DPU). We are successful in fabricating CaF_2 targets of thickness $\approx 264\,\mu g/cm^2$ on carbon backing of thickness $\approx 21.3\,\mu g/cm^2$. The thickness and purity measured by the crystal thickness monitor equipped with the vacuum chamber is verified by different techniques like alpha energy loss, Rutherford Back Scattering (RBS), Electron Diffraction Spectroscopy (EDS) and X-ray Diffraction (XRD). Small impurity level were observed during the observation and the target is successfully used for nuclear reaction experiment. The fabrication of molecular Ca target is found to be more conducive to experimentation since they exhibit less oxidation and herewith we discuss about fabrication technique, experimentation and characterization.

1. Introduction

For nuclear physics experiment, it is extremely important to fabricate targets with the uniform thickness and isotopic purity. In addition, a good target should have excellent tensile strength and flawless adhesion between the film and the substrate [1,2]. The production of isotopically thin self-supporting target is very much required for radioactive ion beam nuclear interaction studies [3]; nonetheless, experiments with stable beams are also required to reduce projectile energy loss and reaction product entrapment for maintaining a high level of experimental spectral resolution [4]. Many physical deposition processes, including ion beam sputtering, vacuum thermal evaporation, electron beam evaporation, arc evaporation, direct current sputtering etc., have been developed over time to prepare target. Thin self-supporting target can be prepared using thermal evaporation and ion beam sputtering processes [5,6]. In order to avoid problem during the experiment, the necessary target material is first coated on glass plate with a low Z backing material. Carbon is typically used as the low Z material since it does not react with metal. Due to energy loss in the carbon foil, which offers a distinct and accurate time-of-flight (TOF) spectrum, straggling effect is reduced to a minimum [7,8]. It is also crucial to remember that air gases and moisture are chemically active at room temperature; so, we must limit the amount of time that the target surface is exposed to them during the transfer of air sensitive target.

An attempt has been made to fabricate carbon-backed calcium fluoride (CaF_2) thin films using the evaporation process for the first time at the Inter-University Accelerator Centre (IUAC), New Delhi using electron gun bombardment and resistive heating technique. It is particularly difficult to prepare a target of highly oxidizing material like calcium (Ca), as this makes difficult to recover elastic scattering yields at forward angles. Additionally, a vacuum transfer mechanism must be used to move the Ca target into the scattering chamber. The in-vacuum transfer facility built at IUAC features a complete technique that has been documented in Ref. [9]. This approach works well; however,

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THE EUROPEAN PHYSICAL JOURNAL A

Regular Article - Experimental Physics

Sensitivity of β_4 values extracted from quasi elastic barrier distribution to the 2n transfer channel

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Abstract In recent times, the Fusion Barrier Distributions (FBD) determined from quasi-elastic scattering measurements have been employed to determine the hexadecapole deformation parameter β_4 value precisely. In reactions where transfer channels are favourable, coupling due to transfer may affect the determination of β_4. In order to study the role of transfer channels while determining β_4 from barrier distribution, the quasi-elastic scattering measurements have been carried out in $^{16}O + ^{176}Yb$. Quasi-elastic scattering excitation function has been measured at backward angles with respect to the beam direction and barrier distribution $D^{qel}(E)$ has been derived. Experimentally obtained barrier distribution has been compared with coupled channel calculations using CCFULL code. The effect of two neutron transfer and hexadecapole deformation has been studied using coupled channel calculation. χ^2 was calculated in a two dimensional space of β_4 and neutron transfer strength P_{1r}. Without considering neutron transfer, χ^2 minimization of $D^{qel}(E)$ was not possible and the best-fit was found over a small range of β_4 and P_{1r}. At $P_{1r} = 0.37$, corresponding to minimum χ^2, the β_4 of ^{176}Yb is determined to be 0.00 ± 0.015. This value of β_4 is in agreement with that obtained from Coulomb excitation measurement.

1 Introduction

Heavy ion induced fusion reactions near the Coulomb barrier exhibit a number of interesting phenomena owing to the interplay of nuclear structure and reaction dynamics [1–3]. The effect of nuclear structure has been experimentally observed in the sub barrier fusion excitation function, σ_{fus}, where it is enhanced by orders of magnitude in comparison with the one-dimensional barrier penetration model [2,4,5]. The increased cross sections are attributed to the couplings of low lying collective states [2,6–10] and nucleon transfer channels [2,11,12]. The effect of channel coupling is better visualized when the fusion excitation function is converted into Fusion Barrier Distribution (FBD) which is a double derivative of $E\sigma_{fus}(E)$ with respect to energy E [2]. Due to the coupling of the internal degrees of freedom, a single barrier (uncoupled) splits into a distribution of barrier heights $D(E)$ [2,6–10]. Alternatively, the FBD is obtained by measuring the complimentary flux i.e. quasi-elastic scattering at backward angles [13–15]. Study of nuclear structure via quasi-elastic scattering measurements at the backward angles offers several advantages in comparison to studies involving the fusion excitation functions [2,14,16,17].

In reactions involving deformed partner(s), the coupling of rotational excitation plays a dominant role in lowering the height of the barrier [4,18–21] which can be used to esti-

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Higher Dimensional Bianchi Type-III String Cosmological Models in Lyra Geometry

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Abstract

Here we studied Bianchi type-III string cosmological models generated by means of a cloud of strings with particles connected to them in the framework of Lyra geometry considering five-dimensional space-time. To obtain the exact solutions of field equations we consider that the shear scalar and the scalar expansion are proportional, $\sigma \propto \theta$ which leads to $D=cn$ and secondly we adopt the assumption considering the Reddy String Condition, $\rho+\lambda=0$. From the two different cases obtained here, first case leads to the Bianchi type-III string cosmological model in Lyra geometry in five-dimensional space-time and the second case leads to the five-dimensional vacuum universe in general relativity. The Geometrical and physical properties of the model universe are studied comparing with the present day's observational findings. The model universe obtained here starts with the big bang and as time progresses both particle density ρp and energy density ρ decreases with expansion of our Universe.

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Comprehension of breakup fusion reactions using forward recoil range distribution measurements

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ARTICLE INFO

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Breakup fusion
Forward recoil range distribution
Linear momentum transfer
Universal fusion function

ABSTRACT

To understand the break-up fusion reaction dynamics, the forward recoil range distribution (FRRD) measurements of $^{12}C + {}^{165}Ho$ system at the incident projectile energy of ≈ 88 MeV has been performed. The recoil catcher activation technique followed by the off-line gamma ray spectroscopy was implemented. It is observed that the FRRD measurements of the evaporation residues (ERs) populated via xn and pxn channels have a single Gaussian peak at large cumulative thickness. This is attributed to complete momentum transfer from the projectile to the target nucleus. However, in case of the FRRD measurements of the ERs populated via αxn, αpxn and 2αxn emitting channels, in addition to peak corresponding to complete momentum transfer, the Gaussian peaks at lower cumulative thicknesses are also observed. This is accredited to the breakup fusion. Moreover, the effect of projectile breakup on complete fusion cross section is also studied. The suppression in fusion cross section is observed when compared with the universal fusion function, thus indicating the breakup probability of ^{12}C projectile.

1. Introduction

Study of Heavy Ion (HI) nuclear reactions is a subject of large interest among both theoretical and experimental nuclear physicists. HI reactions make it possible to comprehend the properties of nuclei under extra ordinary conditions due to (I) large momentum transfer (ii) large angular momentum transfer and (iii) transfer of large number of nucleons, from projectile to the target nucleus. Both projectile and the target nucleus are many body quantum systems thus it is quite complex to explain their interaction. However, as the wavelength associated with the HI interaction is of the order of nuclear dimensions, the problem can be treated semi-classically and different reaction mechanisms can be explained on the basis of impact parameter [1]. Depending upon the various impact parameter

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Fabrication and characterization of highly enriched thin ^{176}Yb targets for the reaction dynamic studies on fission mass distribution

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α-energy loss technique
X-ray diffraction (XRD)
Energy dispersive X-ray spectroscopy (EDS)

ABSTRACT

The fabrication, transfer, and storage of a highly enriched isotopic target is very much crucial because of air gases and moisture being chemically active at room temperature. One must limit the amount of time that the target surface is exposed to the atmosphere during the transfer of air sensitive targets. The highly interactive targets are not easy to store for longer time and demand an in-vacuum transfer facility. Getting an alternative technique to remove all such impressive is a need of the hour specially for the nuclear physics community, more particularly for reaction dynamic studies of fission fragment mass distribution induced by stable and radioactive ion beams. Highly enriched materials are rare and very expensive, so an effective and highly efficient technique is needed to deal with such materials. Here, an attempt has been made to fabricate 96.63% enriched thin targets of ^{176}Yb by evaporation technique enabling ≈129.1 μg/cm^2 thickness with a ≈25.93 μg/cm^2 carbon backing to increase its stability and durability. Numerous trials have been performed using natural Yb to optimize the evaporation setup and associated growth parameters for efficient Yb isotope deposition with thin film deposition unit and diffusion pump based coating unit at Inter University Accelerator Centre (IUAC), New Delhi. Thickness and elemental composition of the targets have been analyzed using characterization techniques such as X-ray diffraction, α-energy loss technique, Rutherford backscattering spectroscopy and energy dispersive X-ray spectroscopy. Essentially no significant impurities are found by these measurements, describing high purity and robustness of the fabricated targets. During the nuclear experiments, ^{28}Si and ^{16}O beams of intensity of the order of ≈10^{10} particles per second were bombarded on the targets for 5–6 days and no ill effects on the target were observed. Isotopic abundance of the target has been obtained experimentally, which ensured the isotopic purity of the target required for the reaction studies. This article will admire our readers about the qualitative nature of the fabrication technique, measurement and characterization citing valuable insights, aiding in a comprehensive understanding of their quality.

1. Introduction

Thin target preparation is a critical aspect of nuclear physics experiments, enabling the investigation of various nuclear reactions and the production of radioisotopes. Precise fabrication of thin targets with controlled thickness and high-quality surfaces are essential for accurate measurements and reliable data interpretation in reactions induced by stable [1] and radioactive ion beams [2]. In practice, heavy-ion induced fusion–fission reactions performed in accelerator laboratories require thin targets made up of stable enriched isotopes having smooth surfaces, minimal contaminations and maximum homogeneity, which are then bombarded by heavy-ions of energy ranging from sub-barrier to above barrier region depending upon the interest of measurements. When conducting a study on the distribution of fission fragments masses and its total kinetic energy, it is crucial to have accurate time-of-flight (TOF) measurements. Without precise TOF measurements, energy and angular straggling can impact the resolution of mass measurements [3]. Angular straggling, which arises from the thickness of the target or backing material, also influences the angular

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NEP 2020 AND INDIAN SYSTEM OF THOUGHT

UGC CARE Group 1 Journal

Dr. Rajlakshmi Kalita, Asst. Professor, Dept. of Philosophy, Kamrup College, Chamata.

Abstract:

Education system is the foundation of knowledge, development and prosperity of a nation. In Post In-Independent era Government of India introduced 3 education policies. National Education Policy 2020 is the 3rd education policy introduced in India. In this policy Indian knowledge and thought has been taken as the guiding light. The vision of this policy is to transform India with education system which is rooted in Indian ethos. For creating a deep rooted pride of being Indian and to develop knowledge, skills, value and dispositions among students NEP 2020 aims to work with the values of Indian systems of thought. The objective of this paper is to analyze the significance and role of Indian systems of thought in NEP 2020.

Key words: NEP 2020, education, values, skill, knowledge.

Introduction:

Education system makes a nation stronger and self-sufficient including all aspects of life. India is a land of customs and knowledge. This land is called a treasure trove of culture, developed over thousands of years. The vision of this policy is rooted in Indian ethos. It envisions a massive transformation in education. The objective of this policy is to develop knowledge, skills, values, spirit, intellect, values and dispositions among the students and make them efficient global citizen. Presently India has highest youth population in the world. By proper planning, efficient policy making, training and educating the youth population India can achieve the Viswaguru locus, which is a dream of every Indian. In this whole process Indian knowledge system has a significant role to play. In NEP 2020 Indian ethos and ideology is taken as the foundation for imparting scientific and practical education. The earlier Education policies were attempts to fulfill all needs and overcome the shortcomings of the prevailing system. In present condition when the literacy rate is more than 77 per cent, India is approaching towards a new dawn in the fields of science, technology and literature. The philosophy behind this policy is not only to educate the youth of the country but also to make them world class citizens both practically and spiritually. Here with the great heritage of Indian knowledge system this policy attempts to ensure ***'light but tight'*** regulatory framework to establish integrity, transparency and resource efficiency.

Objective and methodology of the paper:

In this paper an attempt has been made to analyse the role and significance of Indian Knowledge system in NEP 2020. The study is based on both primary and secondary data. In order to assess the role and significance of Indian knowledge system in NEP 2020 conceptual analysis is used in this paper.

Background of Education Policies in India:

Since independence Indian government has been working for improving the education system of India both in urban and rural areas of the country. Government sponsored and implemented many programs and policies to solve the problems of illiteracy and impart education. Maulana Abul Kalam Azad, India's first Minister of Education of independent India envisioned the idea of one uniform education system for all over the country. As a result of this process Indian government established the University Education Commission (1948–1949), the Secondary Education Commission (1952-1953), University Grants Commission and the Kothari Commission (1964–66) in order to build strong education system in India. In 1961 National Council of Educational Research and Training (NCERT) was established as an autonomous organization for promoting, formulating and implementing education policies. A methodical Committee was formed for systematic and well organized education was first introduced in Independent India in the year 1948 under Chairmanshi of Dr. Sarvapalli Radhakrishnan. Afterwards 1st Education policy was promulgated by th

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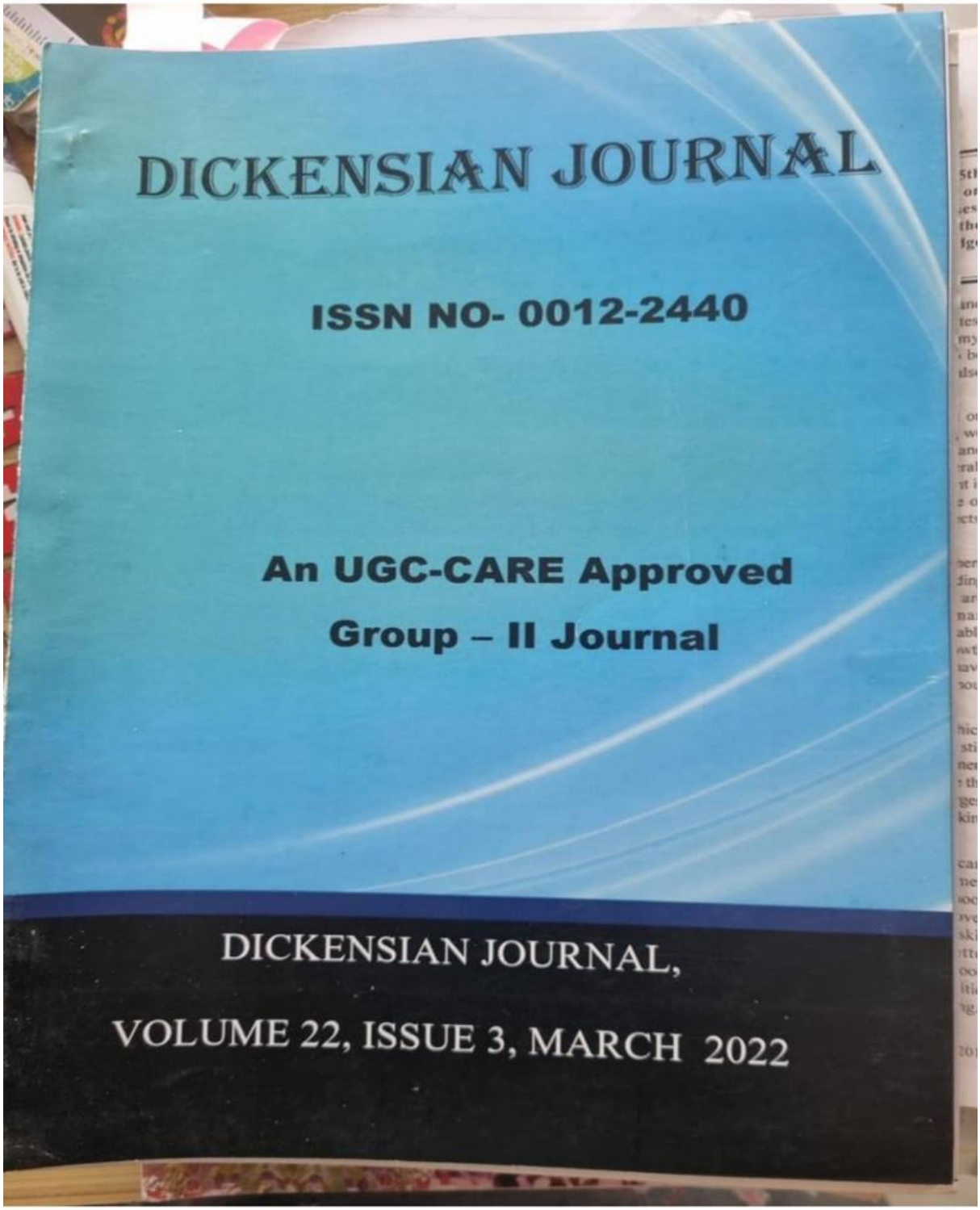

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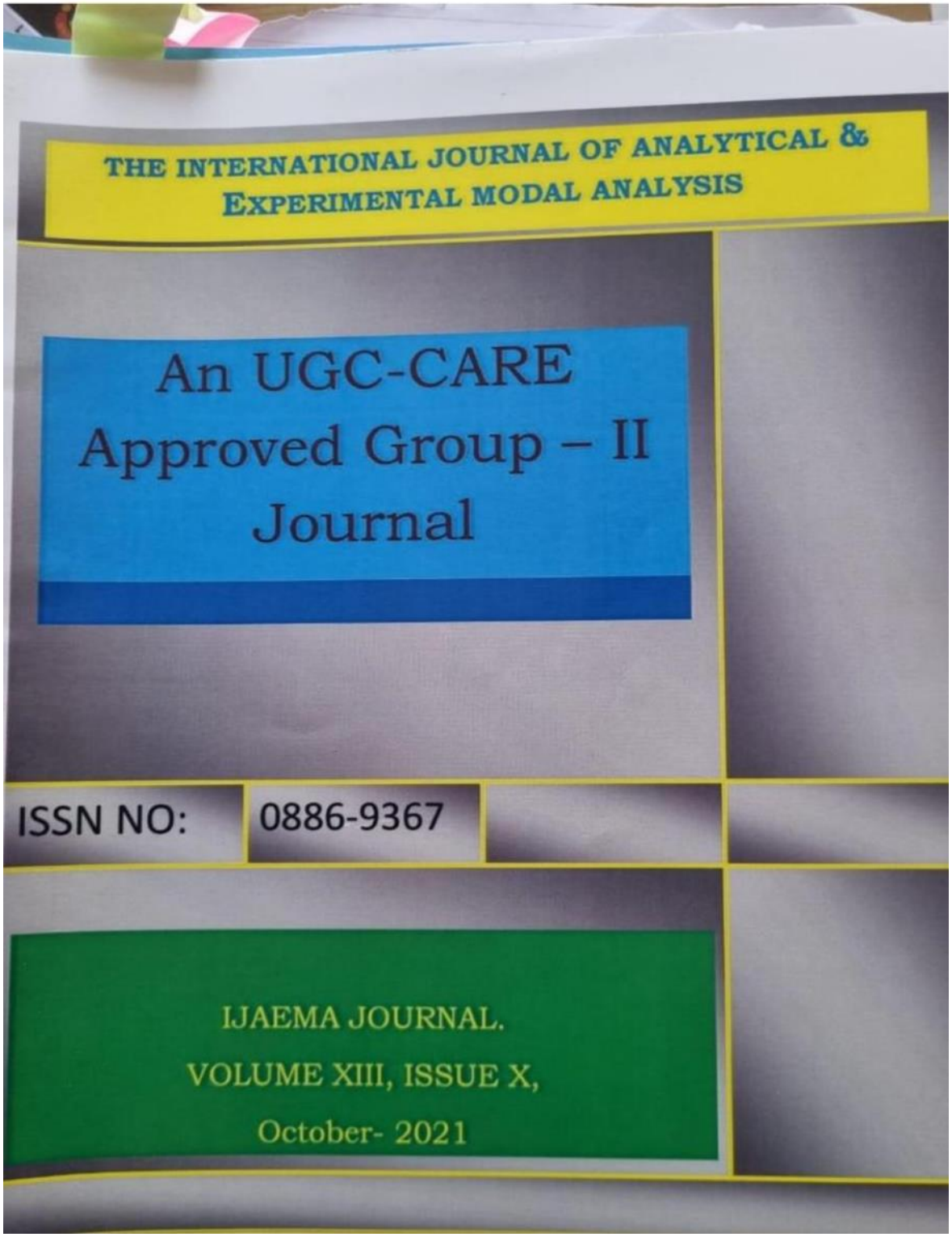

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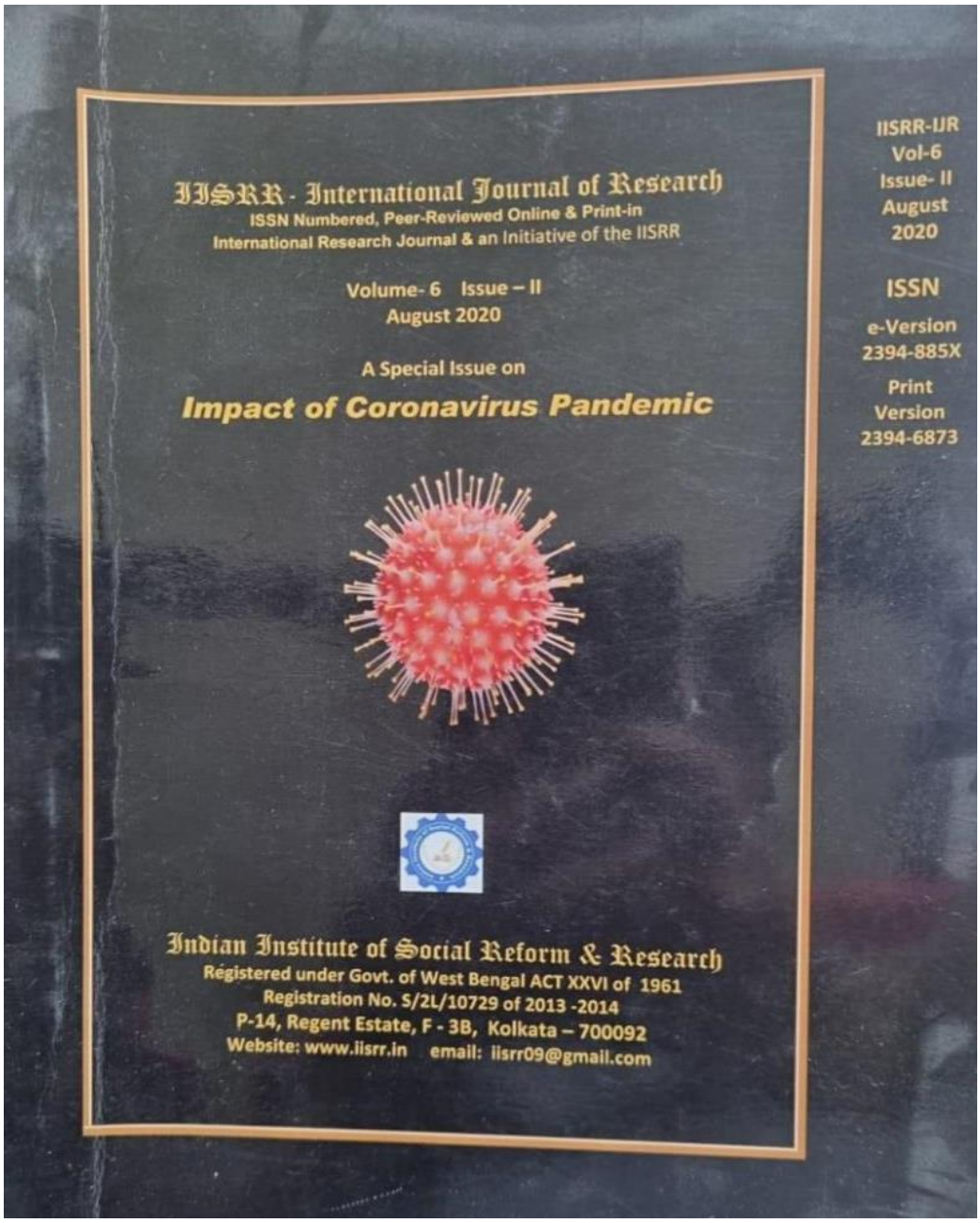

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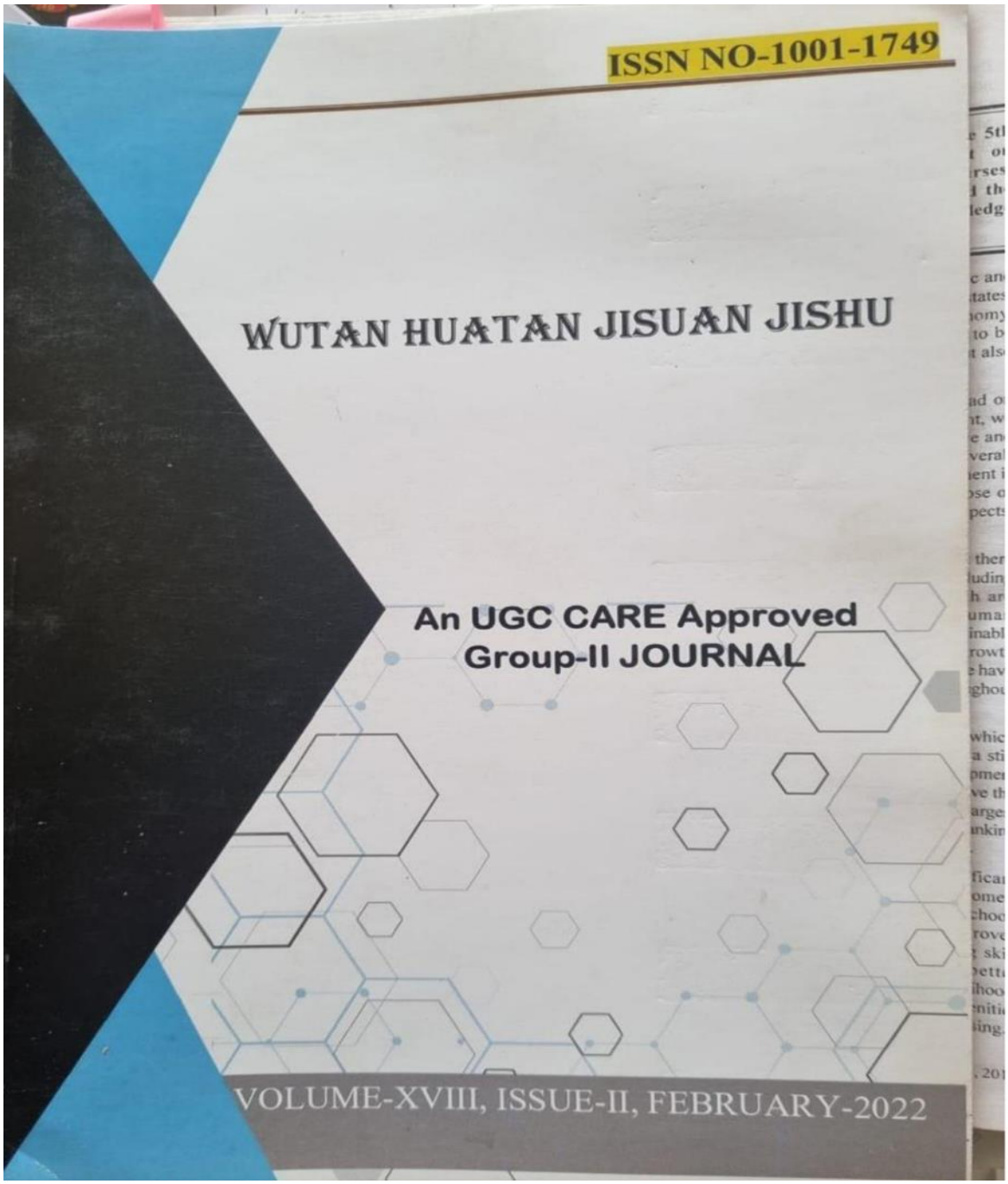

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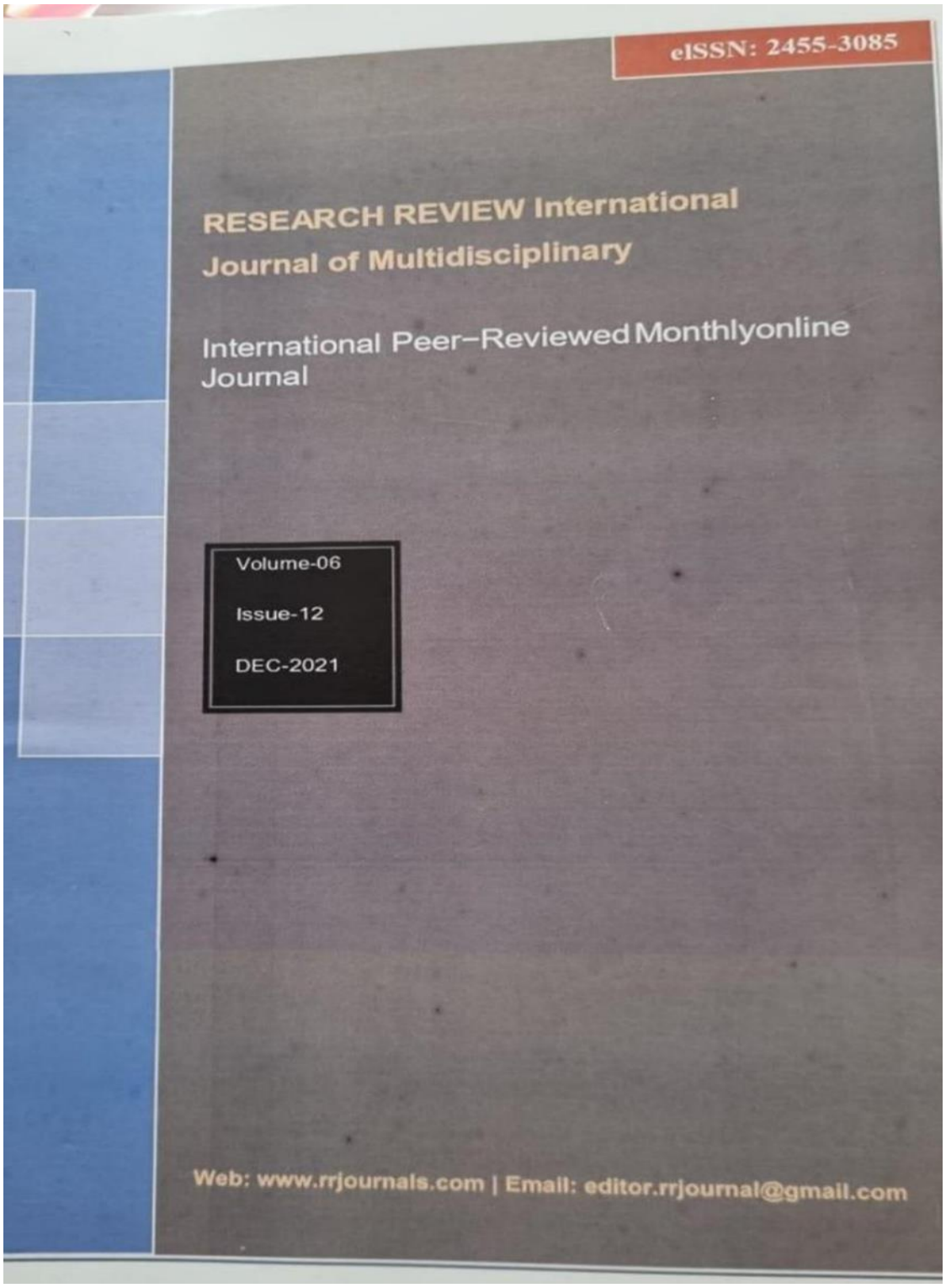

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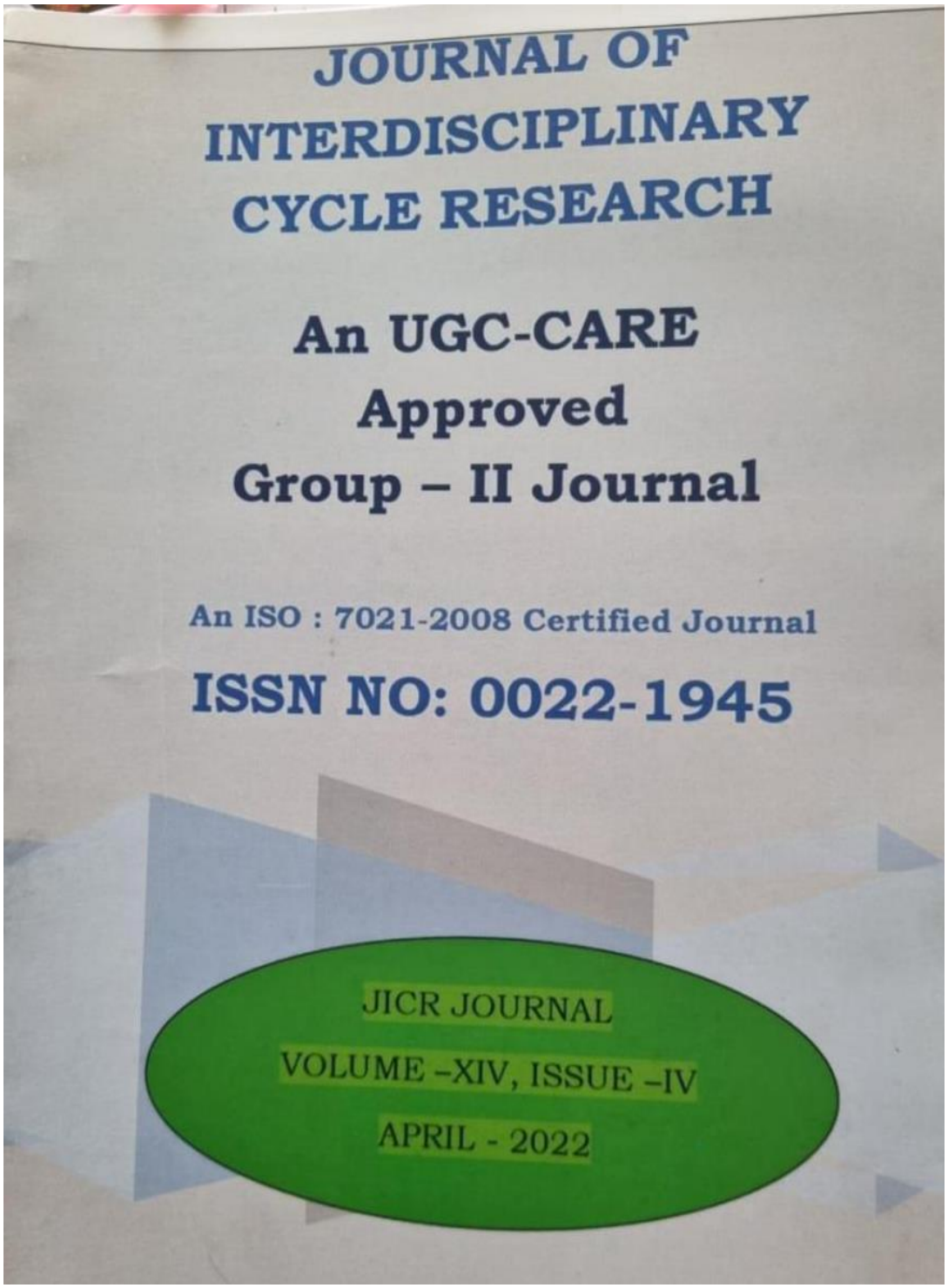

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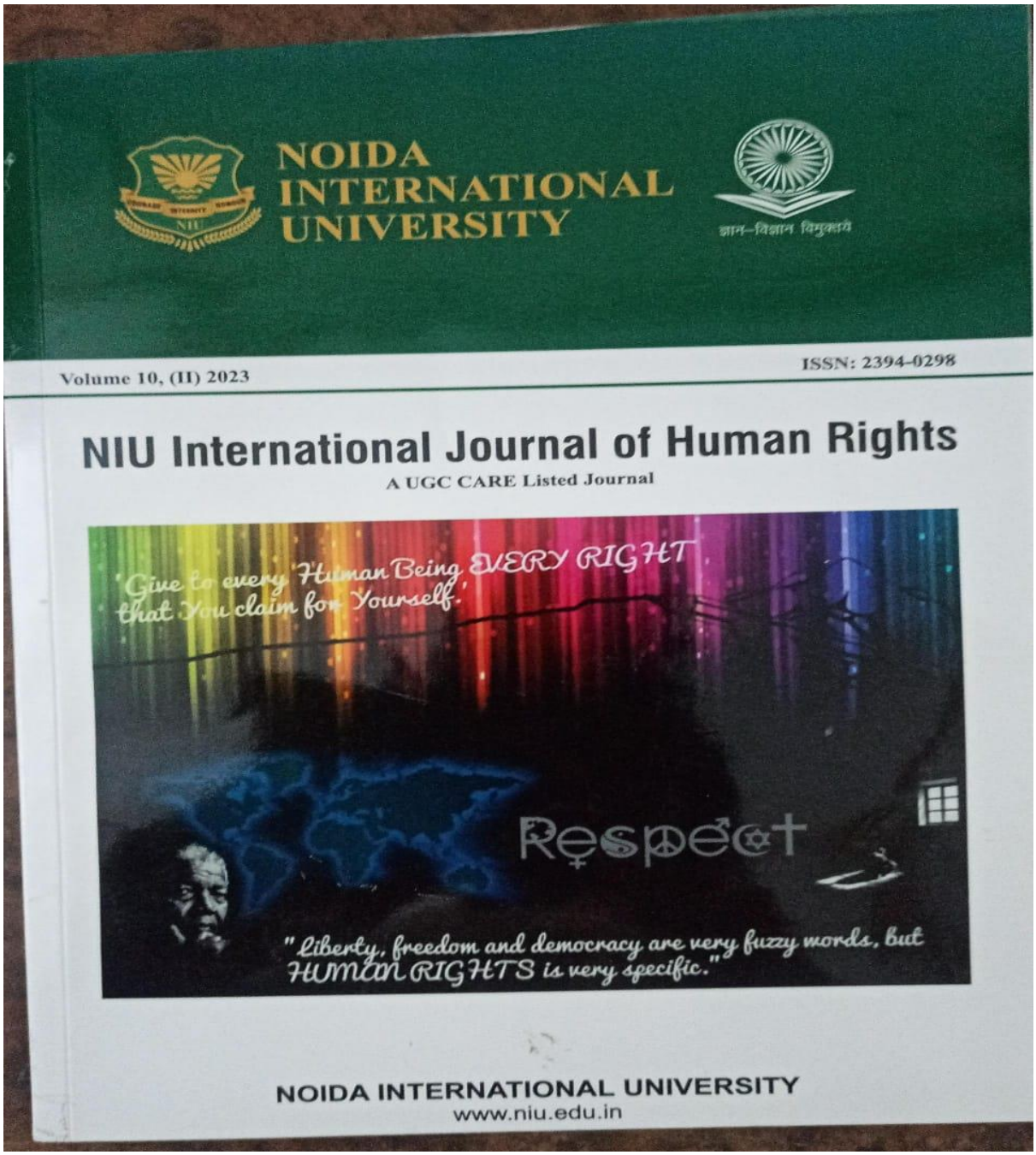

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ETHNIC ISSUES OF ASSAM: SEARCH FOR IDENTITY

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Abstract
Ethnicity implies an identity based upon a arrogant of shared history and habitual bequest cultural inheritance. It means Ethnicity the consciousness or awareness of the people of particular ethnic group. Ethnic conflict arises because of crisis of self identity, feeling of insecurity, Lack of development in socio-economic and educational spheres, Inadequacy of capital to Invest in different ethnic areas, etc. Against this backdrop the paper attempts to focus on the ethnic issues in Assamese literature, language and culture. It also attempts to highlight on the media response to the ethnic issues and suggest policy measures. The study shows that ethnic conflict adversely affects the assamese literature, language and culture. Though much has been done in the field of ethnic study in Assam by noted writers in Assam yet in understanding, propagating and solving the problems of the ethnic issues, media can play an immediate and fruitful role. Democratic, decentralized and social federation can alone provide the scope of progress, equity, social justice and cultural identity to the ethnic groups of Assam.
Key words: Ethnicity, language, literature, culture

Introduction

Ethnicity is made up of what a person is born with or acquires at birth. It is a device as much a focus group mobilization by the leadership of ethnic groups through select use of ethnic symbols for socio-cultural and politico-economical purposes. Ethnic group according to Berghe are defined both by objective cultural modalities of their behavior and by their subjective views of themselves and each other. Ethnicity refers to the consciousness or awareness of the people of particular ethnic group. Phandis points out to five major characteristics of ethnicity. We can understood these points very clearly in the following ways-

1. Every ethnic group believes in real history or legend.
2. They believe in a location, either symbolic or geographical.
3. They feel a share in all the cultural symbols including species, languages, dress and food habits.
4. They are obliged to their group and their individual identity.
5. They must have recognition from other ethnic group as much.

Ethnicity in Assam

Ethnicity is a primitive essence, whose existence can be traced back to the time immemorial. Ethnicity becomes very common phenomenon when one ethnic group compare them with their counterparts and discover something which is characterized as "our" not "their". Even the developed and powerful ethnic groups all over the world are not free from their particular, featured and psychology. During the last few decades, the ethnic consciousness is climbing up day by day. In Assam, there are three current actively engaged in determining the dominant feature of identity-1.Indian nationalism 2. Regionalism and 3. Narrow spatial ethnicity. All these three trends are based on the paradigm of exploitation and injustice of economic opportunity. There are some vital social and religious causes related to the upsurge of ethnicity in our state. Like many other parts of the world, Assam also witnesses the deterioration of the ethnic essence and existence, but not the elimination of it. Despite so many ethnic groups and diversity, the

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Glad to inform that the current edition of Inclusive Volume I, No. 17 – AUGUST 2020 has now been published on time. It's not out of place to mention that this time the schedule of publication has been perfectly followed. It's a fruit of well-coordinated work of many distinguished members of the academia who have extended their constructive hands by investing invaluable time and energy for review and editing work. I am sincerely grateful to everybody and keep remembering their unequivocal support to make it a success.

Special Paper

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Russia's policy on the Kashmir issue and its relation with India

Marie Pegu

Abstract: *This article deals with Russia's stand on India's Kashmir dispute historically and the shaping and evolvement of India's relation with Russia over the years. It tries and examines the major policy relations and how the India-Russia foreign policy dynamics shaped Russian views on the Kashmir problem. It also discusses their treaties of friendship and cooperation in various fields and whether there has been any major changes in Russia's policy on the Kashmir issue over the years.*

Keywords: Article 370, Foreign Policy, Pakistan, Pakistan-Occupied Kashmir, Russia, South Asia

Brief History on the Kashmir Issue

On the eve of India's independence from the British rule on 15 August 1947, the Indian subcontinent was partitioned into two territories that were carved out of British Indian provinces to form the newly formed state of Pakistan. There were about 565 princely states, the fate of which were to be decided by the rulers in those states. Almost 500 of them joined either India or Pakistan. The state of Jammu and Kashmir was one among the princely states that did not join either of the two Union. The then ruler of Jammu and Kashmir, Maharaja Hari Singh established an agreement with Pakistan to continue administering on areas like communication, post and telegraphs, central excise etc and maintain its status quo. But it did not create any arrangements for rights and obligations from the accession. It was Pakistan that violated the agreement and pressurized the Jammu and Kashmir government to ensure its accession. When the ruler of Kashmir disagreed to accede, Pakistan imposed economic sanctions on Kashmir and basic supplies and services promised through the agreement were stopped. Despite that the Maharaja could not be forced to a decision. On 22 October 1947, tribals from north-west frontier invaded Kashmir causing great havoc and destruction, atrocities were committed against women, children, men ravaging villages and towns on their way through. Under such circumstances of an emergency attack, the ruler of Kashmir sought help from India and under the Instrument of

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Georgian Conflict over Abkhazia and South Ossetia: Status of Recognition of the Autonomous Republics

Marie Pegu Doctoral Fellow, Russian and Central Asian Studies, School of International Studies, Jawaharlal Nehru University, New Delhi

Abstract: This article deals with the Russia-Georgia war that took place in 2008 following Georgia's act of aggression against the South Ossetian capital of Tskhinvali. There are various reasons for this proxy war that took place in the South Caucasian region. There is no one reason for the outbreak of the war between Russia and Georgia. Various factors like historical relations between Russia and Georgia during the Russian empire and in the Soviet period as well as the political history of South Ossetia and Abkhazia also played a role. It is important as major powers like the US and Russia were involved in the South Caucasus in what was seemingly a movement for self-recognition of the breakaway and now independent republics of Abkhazia and South Ossetia. The US strategic and military encirclement through giving NATO membership to countries of post-Soviet states was an immediate cause of tension. The newly recognized republics of Abkhazia and South Ossetia apart from seeking to establish diplomatic relations with the international community has to deal with unsettled escalations and skirmishes from time to time at the border with Georgia.

Keywords: Geopolitics, Georgia, Kosovo, NATO, Russia, South Caucasus, U.S

Introduction

With the disintegration of Soviet Union in 1991, Georgia gained independence from the Union of Soviet Socialist Republics (USSR). Following which there were attempts of the autonomous regions of Georgia, namely South Ossetia and Abkhazia to break away from Georgia that led to a situation of civil strife. Russian peacekeeping forces were being deployed under the United Nations Mission in Georgia in Abkhazia and in South Ossetia under a Joint Control Commission. Georgia was witnessing a change of regime with the color revolutions led by various western funded NGOs for promoting democratic regimes which brought President Mikheil Saakashvili to power in 2003. The inability of the Georgian state to provide the basic core functions of statehood fuelled public disillusionment and led the overthrow of Eduard Shevardnadze's government in what was known as the Rose Revolution. The new government under Saakashvili tried on an economic level to ensure a corruption free regime for smooth supply of public goods. Politically, it implied reintegrating the country by bringing the regions of Abkhazia, South Ossetia and Adjara back under the control of the Georgian central government and integrating national minorities into the political and cultural life of Georgia. They were ready to use the help of armed forces if diplomacy proved ineffective. On the other hand, the Russian federation equally tried to maintain its influence over Georgia and the Caucasus region as a whole and viewed the events as part of its own internal affairs, as linked to its national security. In order to restore the territories of Abkhazia and South Ossetia to Georgian sovereignty it tried to build alliances with the United States and Western Europe. Russia had suffered a setback with its disintegration but with the coming to power of President Vladimir Putin, Russia tried to gain its lost power. In the face of western encirclement of Russia by including the former Soviet Republics in its vicinity into the U.S led North Atlantic Treaty Organisation (NATO), Russia tried to reassert its power where it has a stake, the Caucasus. The recognition of Kosovo's independence by the West was reciprocated by recognizing the former republics of Russia in the Caucasus. The war that took place over South Ossetia in August 2008 between Russia and Georgia can be seen in the light of these views. One is geo-political, defining the South Caucasus as the site of a new 'great game' being played out by Russia and America renewing

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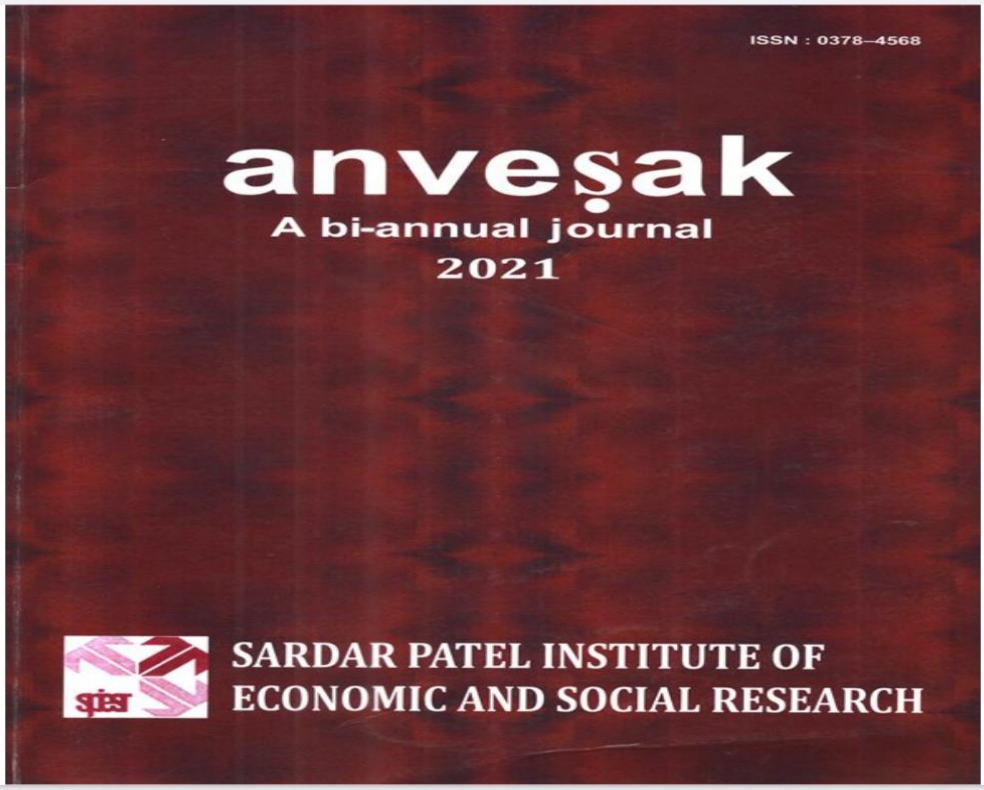

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ANVESAK
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BURNOUT AMONG THE GOVERNMENT AND PRIVATE SECONDARY SCHOOL TEACHERS IN RELATION TO THEIR ORGANIZATIONAL COMMITMENT

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Dr Ritamoni Das
Department Of Education , Kamrup College, Chamata, Nalbari, Assam

Abstract:.
Teacher burnout is a phenomenon in which a teacher is overcome by frustration, a feeling of hopelessness and tiredness. Teacher burnout is a problem that affects teachers at all levels of instruction and can result early or late in the teaching career. The main purpose of this study is to examine the levels of burnout among the Government and private secondary school teachers in Kamrup District in relation to their organizational commitment. A Questionnaire based study was conducted on teachers working in the different schools of Kamrup District. Data were collected using burnout inventory and organizational commitment scale.

Key words: Burnout, School teacher, organizational commitment

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Introduction

Teacher burnout is a phenomenon in which a teacher is overcome by frustration, a feeling of hopelessness and tiredness. The issue of teacher burnout is very important to schools and school systems. Teacher burnout is resulting from teacher's inability to protect themselves against threats to their self-esteem and well being. The problem of teacher burnout is universal. Scholar define teacher burnout as a condition caused by depersonalization, exhaustion and a diminished sense of accomplishment (Schwab et ai.1986).One of the most down to earth definition described teachers as no longer considering themselves professionals, rather just paid individuals. As burned out teachers negatively affect themselves, their students, and the educational system (Hughes, 2001), it is necessary to develop and promote the use of instruments to accurately measure teacher burnout. As a complement to teachers' reports on their own health, their students could give valid information about them, thus helping to discover burnout among teachers at an earlier stage and making timely preventive or restorative intervention strategies possible. Teachers play such a valuable role in helping our children grow up that

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ROLE OF EDUCATION IN WOMEN EMPOWERMENT*

BY

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Abstract:
Empowerment means the capacity to take control of life and power relationship. It gives the strength to fight against any type of subjugation. Empowerment is nothing but exercising equal rights with their male counterparts. It also exercises control over resources that extends to enhance the decision – making process. Education plays a crucial role in building up to the personality and character of a person. It is essential for improving the social and economic development of a nation. Empowerment of women is an essential pre- requisite for social progress of a nation. Education often seen as the main pathway to achieve Women's Empowerment. This is not only because Education is an entry point to opportunity but also because Women are educational achievements have the positive ripple effects within the family and across the generations. As the International Conference on Population and development Programme of action states "Education is one of the most important means of empowering women with knowledge, skills and self-confidence necessary to participate fully in the development process." Empowerment of woman enables woman to respond to the challenges to confront their traditional roles and change their life.

Women play a very special role as they occupy an important and vital position in the society and are a cradle of civilization. "Educate one man, you educate one person, but educate a woman and you educate a whole civilization"—this saying of Mahatma Gandhi is very important. Women education in India has also been a major preoccupation of both the government and civil society as educated women can play a very important role in the development of the country. Education is milestone of women empowerment because it enables them to responds to the challenges, to confront their traditional role and change their life. We cannot neglect the importance of education in reference to women empowerment India is poised to becoming superpower, a develop country by 2020.So that Education of women is the most powerful tool of change of position in society. Education also brings a reduction in inequalities and functions as a means of improving their status within the family.

This paper is an attempt to show how Women's empowerment can be achieved through education and how women's education can help in the reduction of poverty and to make suggestions for improving women.

Key Words: Education, Women Empowerment Powerful tool, Society

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Keywords: Geopolitics, Georgia, Kosovo, NATO, Russia, South Caucasus, U.S

Introduction

With the disintegration of Soviet Union in 1991, Georgia gained independence from the Union of Soviet Socialist Republics (USSR). Following which there were attempts of the autonomous regions of Georgia, namely South Ossetia and Abkhazia to break away from Georgia that led to a situation of civil strife. Russian peacekeeping forces were being deployed under the United Nations Mission in Georgia in Abkhazia and in South Ossetia under a Joint Control Commission. Georgia was witnessing a change of regime with the color revolutions led by various western funded NGOs for promoting democratic regimes which brought President Mikheil Saakashvili to power in 2003. The inability of the Georgian state to provide the basic core functions of statehood fuelled public disillusionment and led the overthrow of Eduard Shevardnadze's government in what was known as the Rose Revolution. The new government under Saakashvili tried on an economic level to ensure a corruption free regime for smooth supply of public goods. Politically, it implied reintegrating the country by bringing the regions of Abkhazia, South Ossetia and Adjara back under the control of the Georgian central government and integrating national minorities into the political and cultural life of Georgia. They were ready to use the help of armed forces if diplomacy proved ineffective. On the other hand, the Russian federation equally tried to maintain its influence over Georgia and the Caucasus region as a whole and viewed the events as part of its own internal affairs, as linked to its national security. In order to restore the territories of Abkhazia and South Ossetia to Georgian sovereignty it tried to build alliances with the United States and Western Europe. Russia had suffered a setback with its disintegration but with the coming to power of President Vladimir Putin, Russia tried to gain its lost power. In the face of western encirclement of Russia by including the former Soviet Republics in its vicinity into the U.S led North Atlantic Treaty Organisation (NATO), Russia tried to reassert its power where it has a stake, the Caucasus. The recognition of Kosovo's independence by the West was reciprocated by recognizing the former republics of Russia in the Caucasus. The war that took place over South Ossetia in August 2008 between Russia and Georgia can be seen in the light of these views. One is geo-political, defining the South Caucasus as the site of a new 'great game' being played out by Russia and America renewing

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a kind of the Cold war era. Second, was the kind of confrontation between Democratic Georgia, which led the first color revolution and a resurgent Russia with growing energy revenues. Third, is the problem of political modernization of the Caucasus as a region and its refusal to cast aside 'ancient hatreds' of the relations between the national groups of Georgians and Ossetians. It was also viewed as a post-colonial war waged by Russia on Georgia for Georgia's self-determination as an independent, democratic state. The war started when Georgia attacked the capital of South Ossetia with artillery and rocket bombardment on 7 August 2008 and captured Tskhinvali the next day. Ten Russian peacekeepers were killed including 1500 people. Russian military responded and within five days it was inside Tbilisi. Russia's view was that when the Georgian army entered Tskhinvali, the peacekeepers had no choice but move to peace enforcement to protect innocent citizens against Georgian aggression. Russia's role was compared to that of U.S role in Serbia.

Geopolitical interests of Russia and the US in the South Caucasus

The geopolitical location of the South Caucasus serves the Russian interests because it acts a "buffer zone" with the North Caucasus and Middle East to its south, sharing border with Turkey and Iran. The border with Turkey and the location of the Black Sea makes Georgia important in the eyes of Moscow. The Russians since the very beginning blamed the Georgians especially Eduard Shevardnadze and Mikhail Gorbachev for the Soviet dissolution. On a strategic and economic level, Abkhazia was of more significance to Russia than South Ossetia. Russia kept South Ossetia under its influence to use it to keep Georgia within the Soviet Union. However Russian influence over Georgia gained momentum only with the coming of President Vladimir Putin to power in 2002. With the adoption of the Law on Russian Federation Citizenship on 31 May 2002, to acquire for Russian citizenship by the post-soviet republics became much easy. By 2008 most of the Abkhaz and South Ossetian citizens had Russian passports. The holders of Russian passport living in South Ossetia were to be treated as equal with the Russian citizens according to the Russian constitutional law.

The U.S stakes in the South Caucasus comes mainly from the fact that it has maintained close political ties with Georgia which helped it to counter Russian dominance in the South Caucasus. The movement of democracy that took place in Georgia called the Rose Revolution was also a West-led revolution that took place in 2003. The Georgian government formed after the revolution under Mikhail Saakashvili had adopted a pro-western outlook and moved closer to the West. Washington under Bush's administration carried out the Georgian Train and Equip Program in 2002 for training and arming the Georgian military. In order to broaden the Georgian armed forces' contribution to the global war on terrorism a Georgia Sustainment and Stability Operations program was launched in 2005. Despite the fact that

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Origin of the Conflict

The secessionist movements that developed in the post-Soviet states, in this case the Abkhaz and South Ossetian separatist movement cannot be merely called a "Russian plot" but it was a kind of awakening process among those ethnic communities (German and Bloch, 2006). With Mikhail Gorbachev's Soviet initiative of perestroika and the rise of Georgian nationalism in the late 1980s, Abkhaz and South Ossetian nationalism also gained momentum as ethnic groups could now freely express their ethnicity. Another action that threatened the South Ossetian and Abkhazian identity was that there was the campaign called 'Georgia for Georgians" started by Zviad Gamsakhurdia. There are certain characteristics of the conflict

state at the time of independence in 1991. According to 1989 census report they constituted 3

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Accession acceded to the Union of India on 26 October 1947. The Instrument of Accession was unconditional, voluntary and absolute and bound the State of Jammu and Kashmir to India legally and constitutionally (Anand 2001). The very next day Indian troops flew to Kashmir and successfully pushed back the invaders from large parts of Kashmir. Since then Pakistan has launched an undeclared war on Kashmir. In a move to not further aggravate the situation in Kashmir, India took up the matter to the United Nations so that the countries of the world could put pressure on Pakistan to stop its aggression on Kashmir. Therefore, India by invoking articles 34 and 35 of the UN (United Nations) charter in the UN Security Council (UNSC) accused Pakistan of assisting its nationals and tribesman in invading Jammu and Kashmir and stated that such an assistance amounted to an act of aggression. The UNSC passed a resolution to this effect on 13 August 1948 and established the UN commission for India and Pakistan (UNCIP) after discussing the matter with the governments of India and Pakistan. The resolution had 3 parts one, dealing with the cease-fire agreement, second, was the truce agreement and last one dealt with determining the future status of Jammu and Kashmir according to the will of the people (Singh 1995). The resolution also called upon Pakistan to withdraw its tribesman from the State of Jammu and Kashmir as well as the Pakistani nationals that have been residing illegally in the state of Jammu and Kashmir. A very important recognition was that of Pakistani troops present inside the territory of Jammu and Kashmir which was constantly denied by Pakistan. Kashmir's legal accession to the union of India was upheld by the Constituent Assembly of Jammu and Kashmir. A constitution was drafted for the state of Jammu and Kashmir with effect from 26 January 1957. It declared that the "State of Jammu and Kashmir is and shall be an integral part of the Union of India". Kashmir which has often been described as a paradise on earth has undergone aggressions and conflicts over the years- in 1947, 1965, and again in 1971. Pakistan has been repeatedly asserting Kashmir's right of self-determination (Kapur 2005). We cannot overlook the fact that despite the accession, promises were made by prominent Indian leaders that Kashmiri people's aspirations would be taken into account as it becomes a part of India.

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Nature of Higher Education in Nep-2020: It's Implementation in Rural Areas and Possible Impact

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INTRODUCTION

In January 2015, a committee under former Cabinet Secretary T. S. R. Subramanian started the consultation process for the New Education Policy. Based on the committee report, in June 2017, the draft NEP was submitted in 2019 by a panel led by former Indian Space Research Organisation (ISRO) chief Krishnaswamy Kasturirangan. The Union Cabinet of India approved the National Education Policy 2020 (NEP 2020) on 29 July 2020. The policy replaces the previous National Policy on Education 1986 and outlines the vision of new education system of India. The policy is a comprehensive framework for elementary education to higher education as well as vocational training in both rural and urban India. The policy aims to transform India's education system by 2040. The NEP 2020 enacts numerous changes in India's education policy. It aims to increase state expenditure on education from around 3% to 6% of the GDP as soon as possible. The policy has a vision of creating a platform to provide quality higher education to every citizen of the country. It aims to transform the country as an equitable and vibrant knowledge society. National Education Policy focuses more on skills of problem solving, innovation, creativity. It takes a wider multidisciplinary approach at higher level of education.

NEP is holistic in nature and believes in integrity. The policy expects to make educational pedagogy more experimental, inquiry based, discovery-oriented, learner-centered, analysis-based, flexible and futuristic so that the education output can support country's economic growth, scientific advancement, cultural preservation and national integration. NEP also takes into account the two pillars of Indian constitution- social justice and equality. The policy puts more focus on accessibility of education by all. The vision of the National Education Policy says: *"National Education Policy 2020 envisions an India-centric education system that contributes directly to transforming our nation sustainably into an equitable and vibrant knowledge society by providing high-quality education to all."* The NEP 2020 calls for key reforms in higher education that prepare the next generation to thrive and compete in the new digital age. Thus, the policy emphasis upon multidisciplinarity, digital literacy, written communication, problem-solving, logical reasoning, and vocational exposure. The NEP 2020 aims at setting up multidisciplinary institutions, whuch will offer programmes with high-quality teaching, research and community engagement. This will benefit the students with increased flexibility in choice of subjects across various streams of arts, humanities, sciences, sports, and other vocational subjects. Education will no more be purely academic and theoretical by nature. The policy envisages a broad-based multi-disciplinary holistic education at the undergraduate level. Education at this level will be integrated and it will have rigorous exposure to science, arts, humanities, mathematics and professional fields. The undergraduate level as mentioned in the NEP 20202 is having imaginative and flexible curricular structure, creative combinations of study, integration of vocational education. Another main feature of the holistic nature of the policy is the multiple entry/exit points.

A holistic and multidisciplinary education will help develop well-rounded individuals who possess critical 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences and professional, technical and vocational fields. Students with such multidisciplinary approach are expected to have an ethic of social engagement; soft skills such as communication, discussion and debate; and rigorous specialization in a chosen field. Such a holistic education shall be the approach of all undergraduate programme including the professional, technical and vocational disciplines in the long term. Holistic and multidisciplinary education should strive in an integrated way to improve all human capacities-mental, cultural, social, physical, emotional, and moral. In the long term, such a comprehensive education shall be the method for all undergraduate programme, including those in medical, technical and vocational disciplines. Optimal learning

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environments and support for students offer a holistic approach including adequate curriculum, interactive pedagogy, consistent formative assessment and adequate support for students.

THE RURAL SCENARIO

Now, if we give a look to the rural condition of education we found that, according to census report of 2011, of the 121 crore Indians 83.3 crore (68.8%) lives in rural areas. The centre for monitoring Indian economy has estimated the average income of rural households in the year 2012-13 was about half the average household income in urban areas. According to socio-economic and cast census 2011 (SECC 2011) manual casual labour (51%) and cultivation (30%) constitute the main source of income in rural households.

In our country about 9.7% of rural households run on salary income, 56% households are landless. In 74.5% of rural households, the highest earning member earns less than Rs.5000 per month. A household do have more than one earning member, means children also help their parents in earnings.

OBJECTIVES OF THE STUDY

- The primary objective of this research is to study the possible impact of multidisciplinary nature higher education as accordance to NEP 2020 in rural areas.
- To study problems of higher education in rural areas.

RESEARCH METHODOLOGY

This research is descriptive in nature. The data was collected from secondary sources like various websites including those of Government of India, journals, research articles, other publications and the NEP 2020 document itself. The data was then analyzed and reviewed to arrive at the inferences and conclusions.

HOLISTIC AND MULTIDISCIPLINARY NATURE OF HIGHER EDUCATION

The NEP 2020 claims that, a holistic and multidisciplinary education will develop the total personality of students. Capacities of human beings such as- intellectuality, aesthetic sense, socialization, physical growth, emotional development and morality need proper education and training to grow. Multidisciplinary education will help to develop well-rounded individuals that possess critical 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences and professional, technical and vocational fields; an ethic

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emotional, and moral. In the long term, such a comprehensive education shall be the method for all undergraduate programme, including those in medical, technical and vocational disciplines. Optimal learning

environments and support for students offer a holistic approach including adequate curriculum, interactive pedagogy, consistent formative assessment and adequate support for students.

THE RURAL SCENARIO

Now, if we give a look to the rural condition of education we found that, according to census report of 2011, of the 121 crore Indians 83.3 crore (68.8%) lives in rural areas. The centre for monitoring Indian economy has estimated the average income of rural households in the year 2012-13 was about half the average household income in urban areas. According to socio-economic and cast census 2011 (SECC 2011) manual casual labour (51%) and cultivation (30%) constitute the main source of income in rural households.

In our country about 9.7% of rural households run on salary income, 56% households are landless. In 74.5% of rural households, the highest earning member earns less than Rs.5000 per month. A household do have more than one earning member, means children also help their parents in earnings.

OBJECTIVES OF THE STUDY

- The primary objective of this research is to study the possible impact of multidisciplinary nature higher education as accordance to NEP 2020 in rural areas.
- To study problems of higher education in rural areas.

RESEARCH METHODOLOGY

This research is descriptive in nature. The data was collected from secondary sources like various websites including those of Government of India, journals, research articles, other publications and the NEP 2020 document itself. The data was then analyzed and reviewed to arrive at the inferences and conclusions.

HOLISTIC AND MULTIDISCIPLINARY NATURE OF HIGHER EDUCATION

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Towards the attainment of such a holistic and multidisciplinary education, the flexible and innovative curricula of all HEIs as the NEP 2020 has maintained, shall include credit-based courses and projects in the areas of community engagement and service. The policy has also given at most importance to the study of environmental education and value-based education. Environment education will include areas such as climate change, pollution, waste management, sanitation, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation and sustainable development and living. Value-based education will include the development of humanistic, ethical, Constitutional, and universal human values of truth (satya), righteous conduct (dharma), peace (shanti), love (prem), nonviolence (ahimsa), scientific temper, citizenship values and also life skills. The policy recommends lessons in seva/service and participation in community service programme as an integral part of a holistic education system.

As the world is becoming increasingly interconnected, Global Citizenship Education (GCED), a response to contemporary global challenges, will be provided to empower learners to become aware of and understand global issues and to become active promoters of more peaceful, tolerant, inclusive, secure, and sustainable societies. Finally, as part of a holistic education, students at all HEIs will be provided with opportunities for internships with local industry, businesses, artists, crafts persons, etc., as well as research internships with faculty and researchers at their own or other HEIs/research institutions, so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

PROBLEMS OF IMPLIMENTATION OF MULTIDISCIPLINARY APPROACH IN RURAL AREAS

HIGH COST OF EDUCATION: People belonging to rural areas have meager incomes. That is why they cannot afford to send their children to colleges especially to technical institutes where cost of education is very high. Most of the children from such poor families assist the earning member of the family to add up some extra income to the family. Private schools or colleges are more expensive which discourage parents to send their children to these colleges.

HIGH TEACHER STUDENT RATIO: This is also a prominent characteristics of rural education. Although it has been recommended that an ideal teacher-student ratio is 1:30 for the general undergraduate courses, but because of lesser no. of institutes in rural areas, more and more students are bound to enroll leading to high teacher student ratio. This certainly effects the quality of education since teacher cannot pay full attention towards each and every student.

HIGH DROPOUT RATE: Dropout rate in rural areas are very high. Dropout means leaving education midway for practical reasons or necessity by a student, without completing the prescribed course. Reasons for failure in exams are such as- burden of family, financial reasons, attitude of parents towards higher education etc.

MEDIUM OF INSTRUCTIONS: Higher ducation system in India is billingul. Mostly, in Govt. schools the medium of instruction is regional language while in Private schools it is English. Since majority of schools are imparting education in mother tongue language, the student of these schools find it difficult to cope up or proceed to the higher level. Also, there is a scracity of good books in reginal language in higher education.

WEAK PRIMARY EDUCATION: Primary education is the foundation of a nation, which mostly depends on the status of its school going population. However, it is sad to note that quality of Indian school system in rural areas is very poor. When they go for higher education, they face a lot of difficulties. Most of the students find it difficult to pass the entrance examinations and competitive examinations.

LOW GROSS ENROLMENT RATIO (GER): Measures the access level by taking the ratio of persons of all age groups enrolled in various programmes to the total population in the age group between 18-23. The rural urban

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धर्मशास्त्रेषु स्त्रीमर्यादा

डॉ. सुबोध कुमार मिश्र भागवती

कामरूपमहाविद्यालयः चामता असमः

सर्वकर्मप्रारम्भे गणाधीशेन सह भूमिपूजनमवश्यमेव करणीयम्। भूमातृपूजनस्य धारा सनातनधर्मे प्रचलिता। गौरी, पद्मा,शची, मेधा, सावित्री, विजया, जया, देवसेना, स्वधा, स्वाहा, धृति, पुष्टि, तुष्टि, अभीष्टदेवीति चतुर्दशमातृकावर्णनं गोभिलस्मृतिशास्त्रे उपलभ्यते (१/११-१२)। श्रीश्रीचण्डीशतके नवदुर्गायाः उल्लेखःवर्तते या दुर्गा मातृरूपेण संस्थिता। योगिनीतन्त्रे चतुःषष्टीयोगिनीवर्णनमुपलभ्यते। दिव्यभावयुक्ता माता प्राचीनकालादेव भारतवर्षे पूजिता वर्तते। मातृमर्यादायाः गौरवं धर्मशास्त्रेषु यथा उपलभ्यते तथा मातृरूपा नारी कदाचित् स्वतन्त्रताशून्या, मर्यादाहीना चेति दृश्यते। अस्मिन् पत्रे स्त्रीमर्यादाया आरोहणावरोहणदशा भविष्यति।

विद्यालाभः श्रेष्ठकार्यरूपेण प्रतिभाति। प्राचीनकाले स्त्रीशिक्षा भारतवर्षे प्रचलिता आसीत्। हारीतधर्मसूत्रे हारीतेनोक्तं द्विविधाः स्त्रियो ब्रह्मवादिन्यः सद्योवध्वश्च। तत्र ब्रह्मवादिनीनाम् उपनयनम् अग्नीन्धनं वेदाध्ययनं स्वगृहे च भिक्षाचर्येति। सद्योवधूनां तु उपस्थिते विवाहे कथंचिदुपनयनं कृत्वा विवाहः कार्यं इति स्मृतिचन्द्रकायां (प्रथमे भागे २४ संख्यकपृष्ठायां) संस्कारमयूखे (४०२ संख्यकपृष्ठायां) च वर्णितमस्ति। गोभिलगृह्यसूत्रमते बालिकाः प्रतीकरूपेण यज्ञोपवीतधारणं कर्तुं पारयन्ति। यथा- "प्रावृतां यज्ञोपवीतिनीमभ्युदानयन् जपेत् सोमो ददद् गन्धर्वायेति" (२/१/१९)।

मातुः मर्यादा सततं गौरवयुक्ता। अतः मनुसंहितायां मनु उक्तवान्-

"उपाध्यायात्दशाचार्य आचार्याणां शतं पिता।
सहस्रं तु पितॄन्माता गौरवेणातिरिच्यते।।" (२/१४५)

माता यथा पूज्या तथा मातृष्वसा, मातुलानी,श्वश्रूः, पितृष्वसा, गुरुभार्या इत्यादि मातृवत् पूजनीयाः। परन्तु साम्प्रतं भारतवर्षे माता अनादृता वर्तते। बहुक्लेशान् शिरसि निधाय बुभुक्षानिवारणाय मार्गनिर्माणं, गृहनिर्माणाय शिरसि मृत्तिकोत्तलनं, कृषिक्षेत्रेषु श्रमदानं, गृहं गृहं गत्वा परगृहकार्यसम्पादनादि कार्यानि मातरः कुर्वन्ति।

साम्प्रतं भारतवर्षे नारीशिक्षाया उर्ध्वगति उपलभ्यते। शिक्षालाभाय कन्यकाः स्वयमेव भुवि इतस्ततः विचरन्ति। अनेन वक्तुं शक्यते यत् शिक्षालाभैः नारी मर्यादायुक्ता हेतोः उच्चपदालंकरणं कर्तुं समर्था भवति विश्वे। कल्पनाचावोलासदृशानेकाः कन्यकाः महाकाशगमणे समर्थाः भवन्ति। भारतवर्षस्य राष्ट्रपतिरूपेण विदुषी नारी प्रतीभापाटिलेति आसीत् इत्यादि उदाहरणानि सन्ति।

विवाहसंस्कारदशायां विवाहयोग्यांकन्यां उत्कृष्टाय अभिरूपाय वराय विध्यनुसारं दद्यात्। परन्तु गुणहीनाय वराय कन्यासम्प्रदानं न कुर्यात्। उपयुक्तवराभावे ता पितृगृहे मरणपर्यन्तं निवासं करिष्यतीति विधिः मनुना उच्यते (९/८८-८९)।

तथा च स्त्रीणां समावर्तनप्रसंगे आश्वलायनगृह्यसूत्रे उपलभ्यते एवं यथा-'अनुलेपनेन पाणी प्रलिप्य मुखमग्रे ब्राह्मण अनुलिम्पेत्। बाहू राजन्यः। उदरं वैश्यः। उपस्थं स्त्री। ऊरू सरणजीविनः।' इति(३/८/२) परन्तु हारीतमते मासिकधर्मप्रवर्तनात् प्रागेव स्त्रीणां समावर्तनकर्म भवेत् (संस्कारप्रकाशे ४०४इति संख्यकपृष्ठायाम्)

ततःप्राप्यते यत् पुराकल्पे कुमारीणां मौञ्जीवन्धनमिति विधिःप्रचलितः वर्तते। स्त्रीणां कृते अध्यापनं वेदानां सावित्रीवाचनं चेति आसीत्। पिता पितृव्यो भ्राता वा स्त्रीयं पाठयितुम् शक्नोति, न अन्ये बहिरागताः शक्याः वर्तन्ते। स्वगृहे कन्यायाः भैक्षचर्या विधीयते। कन्यकानां मृगचर्मपरिधानं, वल्कलधारणं, जटाधारणमिति वर्जितमासीत् इति यमेनोच्यते। (संस्कारप्रकाशे ४०२-४०३संख्यके पृष्ठायाम्)

त्रिंशत्वर्षीयःयुवकः कन्यायाः, चतुर्विंशतिवर्षीय अष्टमवर्षीयकन्यायाः पाणिग्रहणं कुर्यातम् (मनुः ९/९४)

मनुसंहिताया: टीकाकारमते द्वादशशब्देन गर्भद्वादशस्य वर्णनं भवति। वरस्य त्रिभागानामेकभागो कन्यायाः वर्षः भवेत्। उक्तस्य अष्टमवर्षीयस्य अर्थःभवति दशवार्षिकद्विमासा इति।

परन्तु साम्प्रतं भारतवर्षे कन्या यथा अष्टादशवर्षीया भवति तदा सा विवाहयोग्या भवतीति न्यायालयमतम्।

शरीरसंस्कारार्थं जातकर्मसंस्कारादयः स्त्रीणां कृते यथाकालं सुसम्पन्नाःकुर्युरिति मनुना उच्यते मनुसंहितायाम्। यथा -

'अमन्त्रिका तु कार्येयं स्त्रीणामावृदशेषतः।
संस्कारार्थं शरीरस्य यथाकालं यथाक्रमम्।।' (२/६६)

मनुमते विवाहसंस्कारेण स्त्रीणामुपनयनसंस्कारः भवति। तथा च वैदिकमन्त्राणामुच्छारणं स्त्री कदापि न करणीयम्।

परन्तु साप्रतं भारतवर्षे मैत्रेयीगार्गीव कन्यकाःवेदानां मन्त्रोच्चारणं कुर्वन्ति। अध्ययने, अध्यापने स्त्रीयः पारंगताः सन्ति। विविधशिक्षाक्षेत्रेषु [illegible]ः सन्ति।

प्राचीनकाले भारतवर्षे बहुपत्नित्वं न्याययुक्तमासीत। कदुवादिनी नारी विसर्जिता आसीत् (मनुसंहिता-५/८१; बौधायनधर्मसूत्रम्-२/२/६५)।

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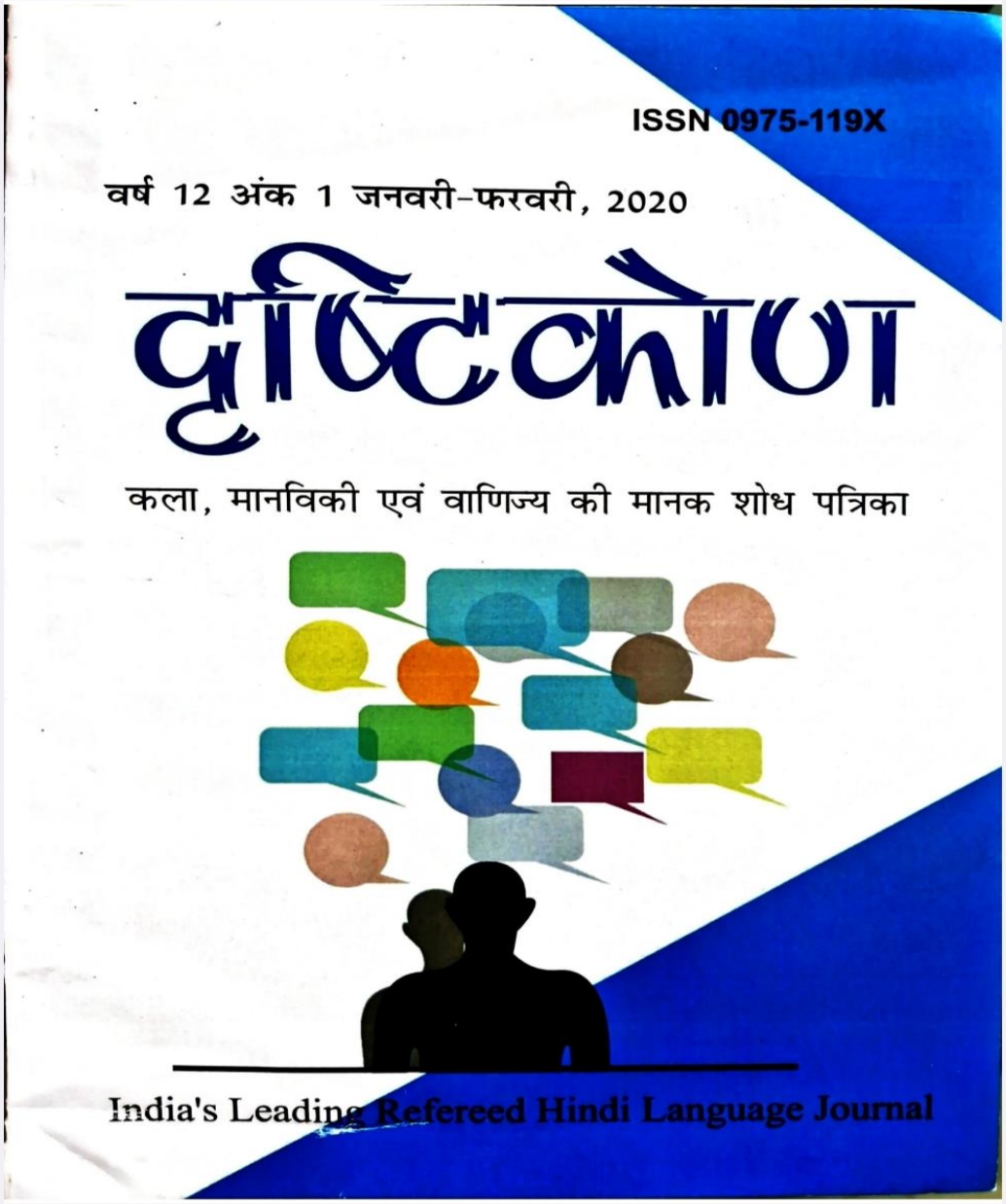

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मध्ययुगीयासमप्रान्तेषु संस्कृतचर्चा

डॉ० सुबोध कुमार मिश्र भागवती

सहकार्य्याध्यापकः, संस्कृतविभागः, कामरूपमहाविद्यालयः, चामता

असमस्येतिहासः युगत्रयेन विभाज्यःवर्तते। प्राचीनकालतः द्वादशशतककालपर्यन्तं प्राचीनयुगान्तर्गतम्, त्रयोदशशतकतः अष्टादशकालपर्यन्तं मध्ययुगान्तार्गतम्, ऊनविंशशतकतः चाधुनिकयुगान्तर्गतमिति उपलभ्यते। प्राग्ज्योतिषपुरीयैतिहासिकयुगेषु ताम्रलिपिषु, प्रचलितशैलालेखेषु वर्मनवंशीयराज्ञामुलेखो वर्तते, यत्र इन्द्रवज्रादिविविधवृत्तिप्रयोगैः विविधशिलालेखाः, कालिकापुराणीयवाक्यानि, हस्तायुर्वेदोद्भववेलाः,मुद्राराक्षसे म्लेच्छजात्युल्लेखवाक्यानि कौलज्ञाननिर्णयेत्यादिविविधेषु ग्रन्थस्थितवाक्यानि, विविधराजोद्भवकालाः च प्राचीनसंस्कृतचर्चायाः प्रवाहवार्ता यद्यपि प्रेरयन्ति तथापि असमप्रान्तीयमध्ययुगीयसंस्कृतचर्चाविषयेषु बहुतथ्यमागच्छति। अत्र मध्ययुगीयासमप्रान्तेषु संस्कृतचर्चाविषयकालोचनदिशा निवेदनकरणं भवति।

खीष्टपूर्वीय-पञ्चशतकषष्ठशतकयोर्मध्यकालोद्भवः पालकाप्यस्य षोड़शाधिकशतश्लोकात्मकः हस्त्यायुर्वेदः (१), खीष्टपूर्वीयषष्ठशतकाष्टशतकयोर्मद्ध्यकालिकस्य श्रीहर्षस्य रत्नावली (२), खीष्टीयद्वादशशततमे वर्षे नीतिवर्मरचितस्य कीचकवधः, खीष्टीयैकादशद्वादशशतकयोः मार्कण्डेयस्य कालिकापुराणम् (३) खीष्टीयैकादेशशतकस्य मीननाथस्य कौलज्ञाननिर्णयः, अकुलवीरतन्त्रम्, कामाख्यागुह्यसिद्धितन्त्रम् (४)तथा च सहयोगिनी नाम तन्त्रोपासकायाः व्यक्तभावानुगततत्वसिद्धिः (५), गोरक्षनाथस्य कामरत्नतन्त्रम्, नागार्जुनयोगीरचितस्य वोधचित्तविवरणम्, योगशतकञ्च इत्यादि असमस्य अनेके ग्रन्थाः सन्ति ये असमप्रदेशीयविविधस्थानेषु सुप्रचलितसंस्कृतचर्चायाः प्राचीनप्रवाहवार्ता यद्यपि प्रेरयन्ति तथापि मध्ययुगे असमप्रदेशः संस्कृतचर्चाया उर्वराभूमिरिव प्रतिभाति।

खीष्टीयत्रयोदशशतिकातः अष्टादशशतिकाकालपर्यन्तं असमे संस्कृतचर्चायाः स्वर्णयुगमासीत्,सम्भवतः त्रयोदशशतिकायां धर्मपुराणस्य उद्भवकालः वर्तते।(६) माधवकन्दली नाम संस्कृतपण्डितः रामायणस्यानुवादं कृतवान् राज्ञः महामाणिक्यस्य काले। तस्य समयः आसीत् खीष्टीयोनविंशत्यधिकचतुर्दशशतिकातः खीष्टीयपञ्चदशशतिकापर्यन्तमिति अनुमीयते। सः लंकाकाण्डे अलिखत् यथा-

"श्लोक संस्कतत आमि गढ़िवाक पारिचाय
करिलोहो सर्वजन बोधे।।"

असमस्य हाजो इति स्थाने जन्मग्रहणं कृतवान् अनन्तकन्दली नाम संस्कृतज्ञः पण्डितः, यः श्रीचन्द्रभारती, भागवताचार्यः,भागवतबट्टाचार्यः इत्यादि विभूषणैर्भूषितः(७)। सः उक्तवान् -

"श्लोक संस्कृत लिखिवाक भाल जानि
तथापि करिलो पदवन्ध।" (मध्यदशम) (८)

भौम-शालस्तम्भादि राज्ञां राजत्वकाले, पालवंशीयराज्ञां राजत्ववेलायां च संस्कृतभाषा राजकीयसन्मानैर्भूषितासीत्।

राज्ञः नरनारायणस्य (राजत्वकालः खीष्टीय१५५४-१५८६) कर्णपूरः पारिजातहरणकाव्यमलिखत्। ततः कोचराज्ञः प्राणनारायणस्य (खीष्टीय१६३३-१६६६) तोषकत्वेन श्रीनाथद्विजः विश्वसिंहचरितकाव्यं लिखति स्म। अष्टादशशतसंख्यकश्लोकैः षष्ठिकादासेति छद्मनामग्रहणं कृत्वा चित्तामोदकाव्यमलिखत्।

ततः नववैष्णवधर्मप्रवर्तकः शंकरदेवः(खीष्टीय१४४९-१५६८) संस्कृतप्राज्ञेषु अन्यतमः आसीत्। सः संस्कृतकाव्यगतविषयमादाय अंकीयेति षट्नाटकानि विरचितवान्। शंकरदेवः नवसप्तत्यधिकशतसंस्कृतश्लोकान् लिखितवान् , यत्र अनुप्रासालंकारः, रूपकालंकारादयः दृश्यन्ते।तथा च शार्दूलविक्रीडितम्, उपेन्द्रवज्रा,उपजातिः,वसन्ततिलकम्, पुष्पिताग्रा,मालिनीत्यादः छन्दप्रयोगाः दृश्यन्ते। अनेन शंकरदेवस्य संस्कृतमयस्य काव्यसौन्दर्यस्य वृद्धिः भवति।

यथा शंकरदेवस्य पत्नीप्रसादनाटकस्य नान्दीश्लोके-

"श्रीकृष्ण कृष्ण सखवृज्ष्यर्षभावनिध्रुग्राजन्यवंशदहनानपवर्गवीर्य्य।
गोविन्द गोद्विज सुरार्तिहरावतार योगेश्वराखिलगुरोभगवान् नमस्ते।।"

शंकरदेवस्य कालियदमनेति नाटके यथा-

"मेघश्यामलमूर्तिमायत महाबाहुं महोरस्थलम्
आरक्तायत कञ्जलोचनयुगं पीताम्बरं सुन्दरम्।।
सुक्ताहीरकहेमहारवलयालंकारकान्तिद्युतिम्
कृष्णं शारदसान्द्रचन्द्रसदृशं हृत्पंकजेऽस्तुजे।।

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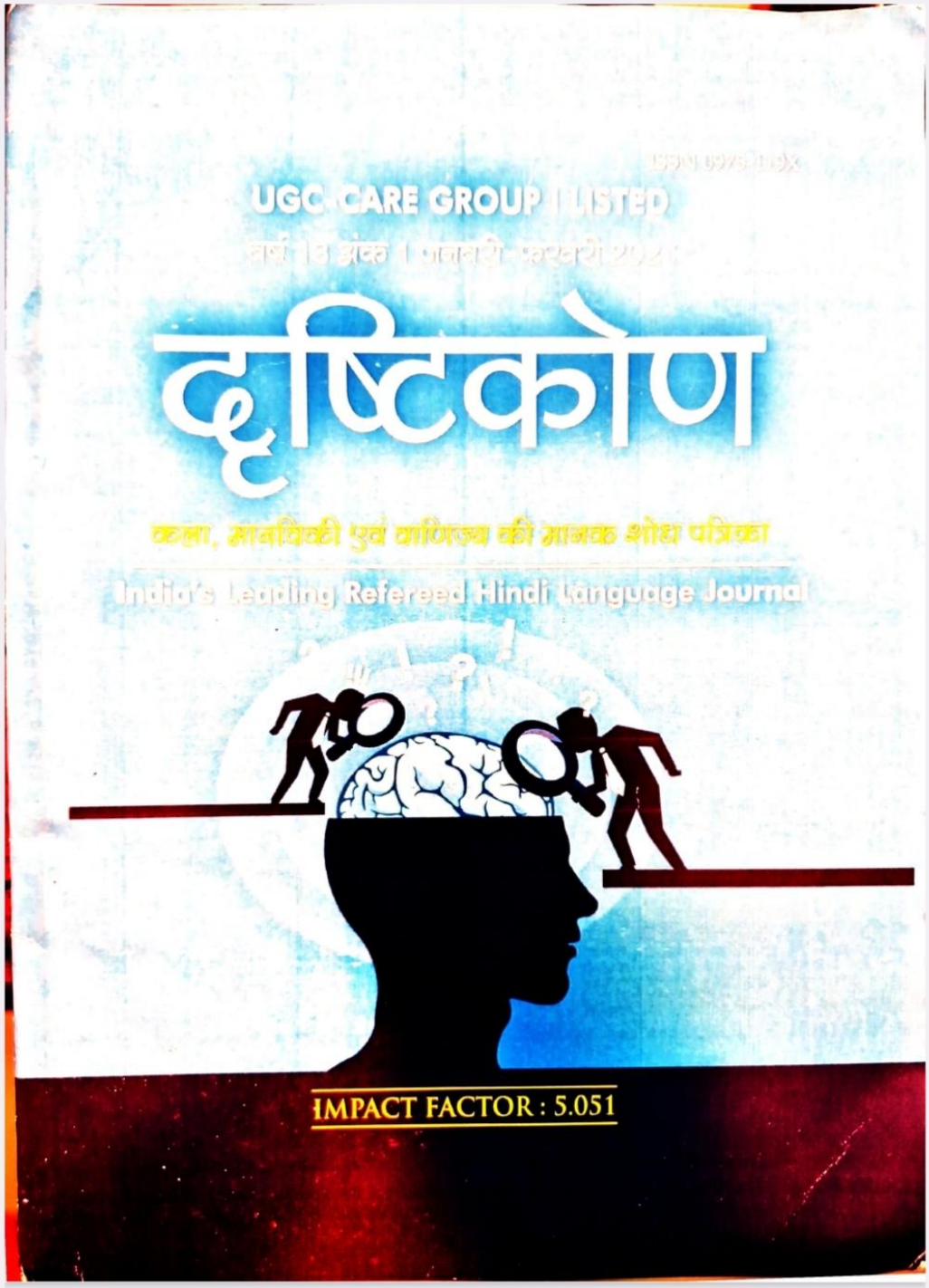

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ROLE OF EDUCATION IN WOMEN EMPOWERMENT*

BY

Dr. Rita Moni Das*
Assistant Professor ,Department Of Education, Kamrup College,Chamata, Nalbari ,Assam

Abstract:
Empowerment means the capacity to take control of life and power relationship. It gives the strength to fight against any type of subjugation. Empowerment is nothing but exercising equal rights with their male counterparts. It also exercises control over resources that extends to enhance the decision – making process. Education plays a crucial role in building up to the personality and character of a person. It is essential for improving the social and economic development of a nation. Empowerment of women is an essential pre- requisite for social progress of a nation. Education often seen as the main pathway to achieve Women's Empowerment. This is not only because Education is an entry point to opportunity but also because Women are educational achievements have the positive ripple effects within the family and across the generations. As the International Conference on Population and development Programme of action states "Education is one of the most important means of empowering women with knowledge, skills and self-confidence necessary to participate fully in the development process." Empowerment of woman enables woman to respond to the challenges to confront their traditional roles and change their life.

Women play a very special role as they occupy an important and vital position in the society and are a cradle of civilization. "Educate one man, you educate one person, but educate a woman and you educate a whole civilization"—this saying of Mahatma Gandhi is very important. Women education in India has also been a major preoccupation of both the government and civil society as educated women can play a very important role in the development of the country. Education is milestone of women empowerment because it enables them to responds to the challenges, to confront their traditional role and change their life. We cannot neglect the importance of education in reference to women empowerment India is poised to becoming superpower, a develop country by 2020.So that Education of women is the most powerful tool of change of position in society. Education also brings a reduction in inequalities and functions as a means of improving their status within the family.

This paper is an attempt to show how Women's empowerment can be achieved through education and how women's education can help in the reduction of poverty and to make suggestions for improving women.

Key Words: Education, Women Empowerment Powerful tool, Society

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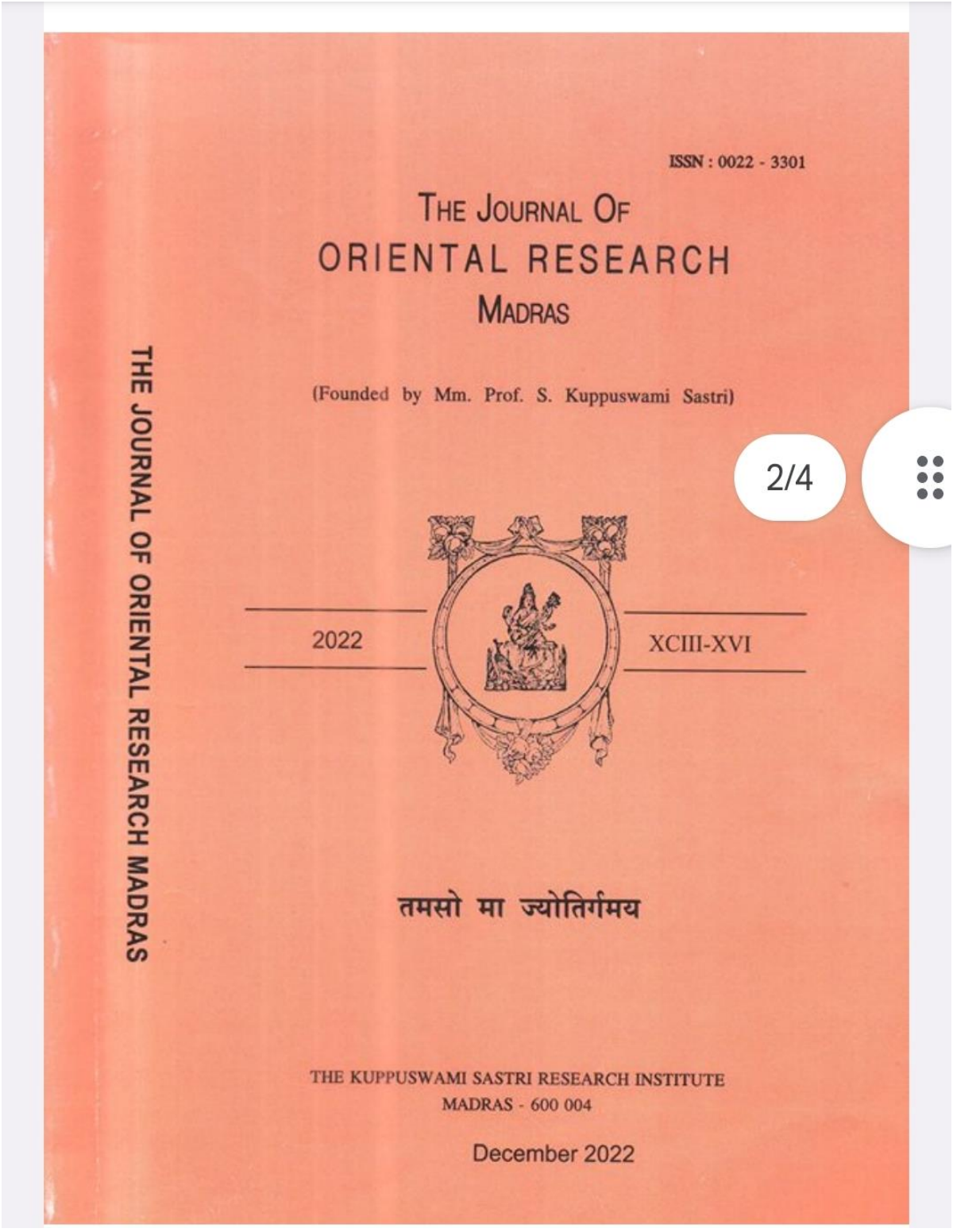

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namastasyai namo namaḥ.'

2. Objectives :

The study depends on following objectives :

(i) To highlight the different aspects, related to womanhood.

(ii) It also helps women to understand their rights to equal treatment like a man in the society.

(iii) To study the responsibility of women in the Ṛgvedic time.

(iv) To identify the women rights in the most celebrated work of ancient Veda, i.e. The Ṛgveda.

3. Methodology Applied :

In the present work, the description and analytical methods of study have been adopted. At first, the materials have been collected from both primary and secondary sources.

4. Discussion :

4.1 Rights of women in the Ṛgveda :

To know about a society, in a proper way, it is important to mark out what position a woman enjoys in a family and a society.

Here, discuss the rights of women in various aspects during the Ṛgvedic period.

4.2.1 Woman as a daughter :

In the Ṛgvedic period, the family organized on patriarchal in character. The birth of the sons was an occasion for rejoicing naturally. The daughter is less desirable than son. In a family a daughter saw the light of the day, all care was taken to bring her up. She enjoyed all parental affection and was used nursed cheerfully. Though women enjoyed a respectable position in society. Besides, in the Ṛgvedic society, the parents were equally affectionate towards their son and daughter. It is seen that a daughter was much loved and taken care of and fondly brought up their parents.[4] A sonless father or the father of a daughter only agreements that his daughter's son will his son who can perform his burial ceremony.[5] In a family, married couple is seen desiring to reach their space of life with sons and daughters growing by their side.[6]

4.2.2 Woman as a wife :

The position of women, after marriage, in her husband's house was one of honour and respect. The role of woman as a wife was recognized as much commendab described as the ornament of the home.[7] She was merciful to the friends and r consecrated to her husband.[8] Her daily routine also described in the Ṛgveda. bed early in the morning, awaked others from their sleep and instructed the n their duties. She applied herself to household duties like as dusting, sweeping and washing the floors and scrubbing and cleansing the cooking pots and utensils. After an early bath, she offered the morning oblations to the household fire with her husband and repeated the practice at mid-day and in the evening.[9] The household fire burning was obligatory duty of her. She was gave up wholly to her husband, dutifulness to her parents and loving to his brothers and sisters. She had the right to perform sacrifices with her husband in the society which is clearly marked in the Ṛgveda.[10] She is embodiment of home itself. The wife is most favourable[11] and deal with as the samrājñī of the house.

4.2.3 Woman as a mother :

As a mother woman commanded the highest respect. Woman plays an important role in the maintenance of her husband's family by procreating children. Motherhood has

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RIGHTS OF WOMEN IN THE VEDIC AGE WITH SPECIAL REFERENCE TO THE ṚGVEDASAṀHITĀ

Dr. Tapan Kumar Kashyap
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Abstract

In the age of the Ṛgveda, the women were in high status in the society. They enjoyed a respectable position in society. In the days of the Ṛgveda, women are seen to have enjoyed greater freedom and equality. In Indian society, women took peculiar position from ancient time. From the Vedic mantras specially the Ṛgveda, we can know that image of women were too much high in pre-historic time. The participation of women in any excellent work of society were inevitable. Women are sentimental. There is no medicine as women or wife for the sick or suffering person. Man has no friend or help as equal as wife. Women are that who gives nutrition. Women are described as adorable in the Veda and smṛti literature. In the world, women are manager of his house. Their area of activity is not restricted within house. Right the very term denotes what a person deserves in a society. In every group of people the right of women defines status of women. The present paper is unique because it attempts to look into rights of women in the Vedic age with special reference to the Ṛgvedasaṁhitā.

Key words : Ṛgveda, Right, Women, Wife, Mother

1. Introduction :

The Vedic literature is the oldest Indo-European literary monument, where the cultural heritage of the people of the then India is reflected. The Vedic literature, which is enormous in size, comprises the four Vedas, viz, the Ṛgveda, the Yajurveda, the Sāmaveda and the Atharvaveda. The Ṛgveda has been reckoned at the first position. This Veda is considered to be the best source of cultural information of the Vedic period. The Ṛgveda was likely composed between roughly 1700-1100 BCE, making it one of the oldest texts of any Indo-Iranian language, one of the world's oldest religious texts. The Ṛgveda is the least significant of all the Vedas.

During Ṛgvedic period, women had respect opportunities to develop within their domestic spheres. Women are the indispensable part of a society and a family. Without women any work or speech is meaningless. From ancient time women were took position as goddess, mother, wife, sister and daughter. The role of women is described in Śāstra as follows :

"kāryeṣu mantrī, karaṇeṣu dāsī, dharmeṣu mātā kṣamayā dharitrī |
sneheṣu mātā, ramaṇeṣu veśyā, raṅge sakhī lakṣmaṇe sā priye me ||"

Bhiṣma also mentioned the majesty of women in front of Yudhiṣṭhira in the Mahābhārata[1] as :

"na gṛhaṁ gṛhamityāhu gṛhiṇī gṛhamucyate |
gṛhaṁ tu gṛhiṇīhīna araṇyasadṛśaṁ matam ||"

The great poet Kālidāsa also mentioned the greatness of women in the eight cantos of Raghuvaṁśa Mahākāvyam[2]: 'gṛhiṇī sacivaḥ sakhī mithaḥ priya śiṣyā lalite kalāvidhau' i.e. house-wife is the adviser of husband, friend and favourite disciple in art.

In the Manusmṛti, it is also mentioned that deities acquired happiness where women are worshipped, but all profession is seedless where women are neglected by people[3]. They are adorned in the world as mother – 'yā devī sarvabhūteṣu matṛrūpeṇa saṁsthitā, namastasyai

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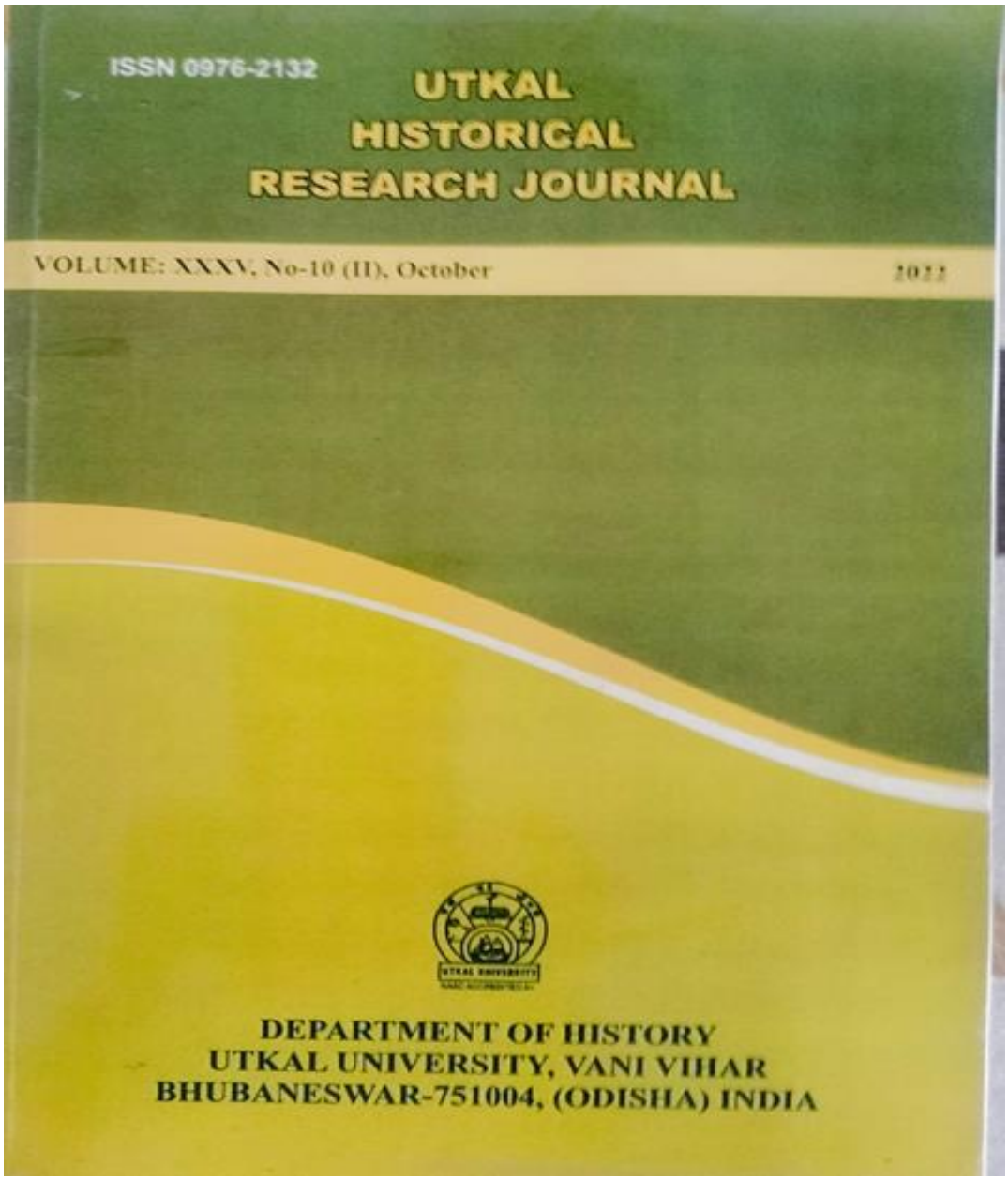

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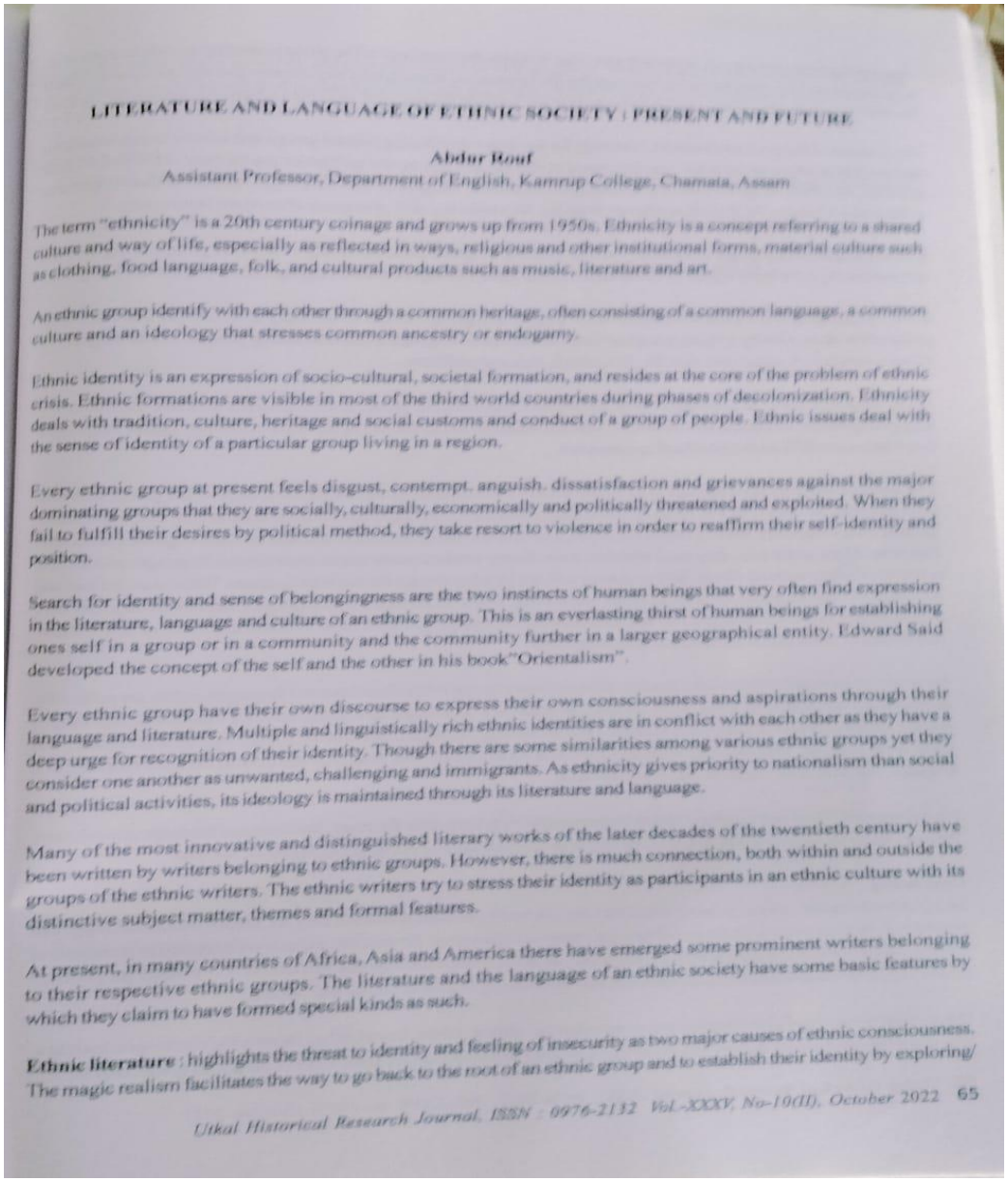

LITERATURE AND LANGUAGE OF ETHNIC SOCIETY : PRESENT AND FUTURE

Abdur Rouf
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The term "ethnicity" is a 20th century coinage and grows up from 1950s. Ethnicity is a concept referring to a shared culture and way of life, especially as reflected in ways, religious and other institutional forms, material culture such as clothing, food language, folk, and cultural products such as music, literature and art.

An ethnic group identify with each other through a common heritage, often consisting of a common language, a common culture and an ideology that stresses common ancestry or endogamy.

Ethnic identity is an expression of socio-cultural, societal formation, and resides at the core of the problem of ethnic crisis. Ethnic formations are visible in most of the third world countries during phases of decolonization. Ethnicity deals with tradition, culture, heritage and social customs and conduct of a group of people. Ethnic issues deal with the sense of identity of a particular group living in a region.

Every ethnic group at present feels disgust, contempt. anguish. dissatisfaction and grievances against the major dominating groups that they are socially, culturally, economically and politically threatened and exploited. When they fail to fulfill their desires by political method, they take resort to violence in order to reaffirm their self-identity and position.

Search for identity and sense of belongingness are the two instincts of human beings that very often find expression in the literature, language and culture of an ethnic group. This is an everlasting thirst of human beings for establishing ones self in a group or in a community and the community further in a larger geographical entity. Edward Said developed the concept of the self and the other in his book"Orientalism".

Every ethnic group have their own discourse to express their own consciousness and aspirations through their language and literature. Multiple and linguistically rich ethnic identities are in conflict with each other as they have a deep urge for recognition of their identity. Though there are some similarities among various ethnic groups yet they consider one another as unwanted, challenging and immigrants. As ethnicity gives priority to nationalism than social and political activities, its ideology is maintained through its literature and language.

Many of the most innovative and distinguished literary works of the later decades of the twentieth century have been written by writers belonging to ethnic groups. However, there is much connection, both within and outside the groups of the ethnic writers. The ethnic writers try to stress their identity as participants in an ethnic culture with its distinctive subject matter, themes and formal features.

At present, in many countries of Africa, Asia and America there have emerged some prominent writers belonging to their respective ethnic groups. The literature and the language of an ethnic society have some basic features by which they claim to have formed special kinds as such.

Ethnic literature : highlights the threat to identity and feeling of insecurity as two major causes of ethnic consciousness. The magic realism facilitates the way to go back to the root of an ethnic group and to establish their identity by exploring/

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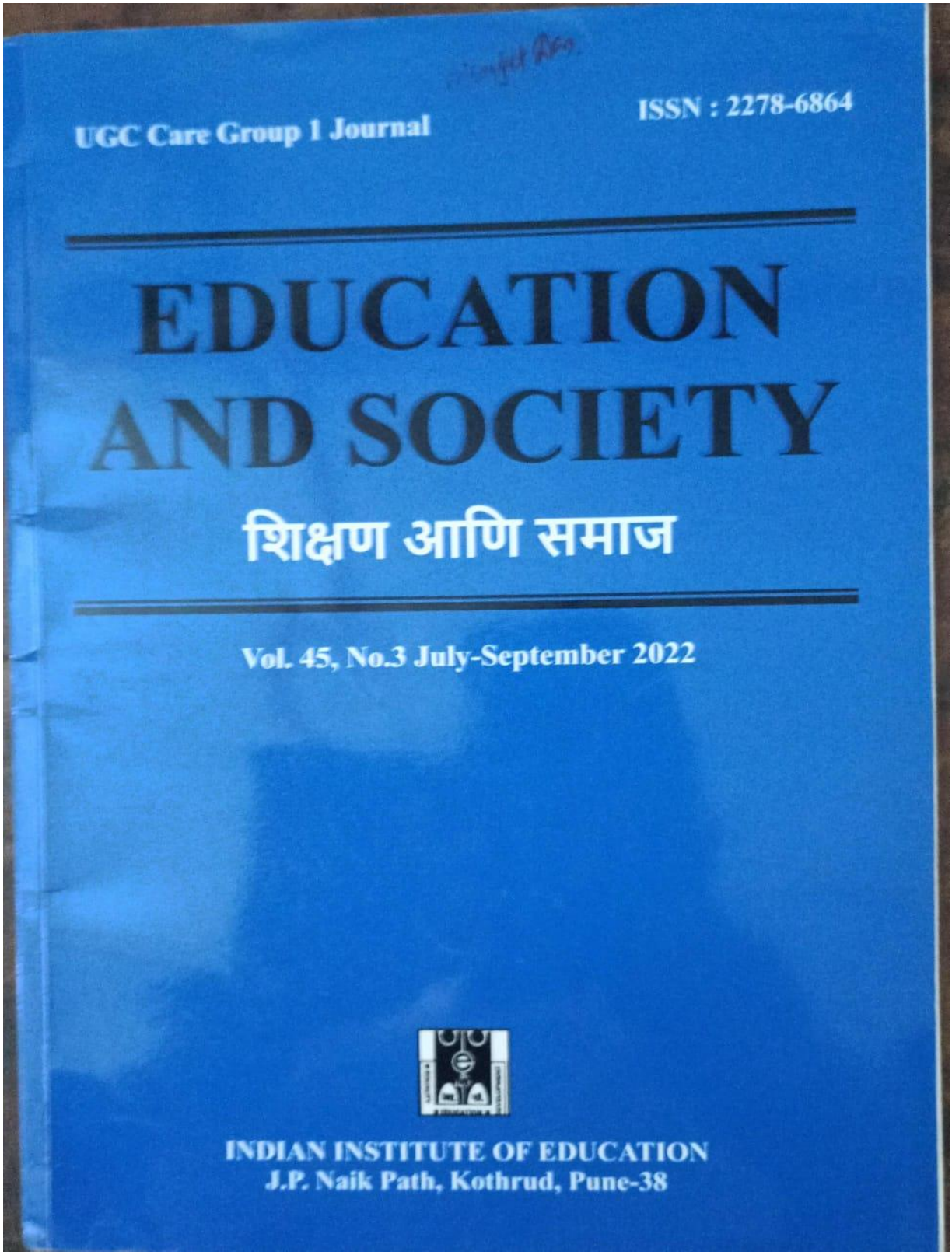

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THE NATURE CONSUMPTION EXPENDITURE OF SCHEDULE CASTES (SCS) COMMUNITY- A CASE STUDY

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Abstract
The consumption expenditure pattern of rural households is very important for understanding economic fluctuations and trade cycle in an economy. Aggregate consumption expenditure determines aggregate saving and output in the economy. The study was carried on consumption expenditure of SCs households of Hajo development block of Kamrup (rural) district of Assam. Mostly SCs household are rural oriented, illiterate academically and finacially, socially and economically poor with low income and high propensity to consume. The studyattempts to focus on socioeconomic features, financial literacy status of sample households. The study also examines the consumption expenditure pattern of Schedule Castes (SCs) tribe as well as per capita consumption expenditure on food and non-food items together. For the purpose of the study five villages was selected with 75 sample households for investigation through multi stage sampling techniques. The collected data has been presented in tabular form and percentages. The core of the study was based on primary sources of data. The study reveals that sample households has joint family norms, financially illiterate, majority of them are involve in fishing profession, high average consumption expenditure and low income during the period of the study. Finally, on the basis of major findings suitable policy suggestions has been made.
Key words: Consumption, Saving, output, income, expenditure

Introduction

In economics consumption refers the use of goods and services by household sector. It plays a crucial role in economics as well as social life among the three basic economic activities like production, consumption and distribution. Consumption refers to the utility or satisfaction obtained from the uses of goods or services. It is distinct from consumption expenditure, which is the purchase of goods and services for use by household sector. Consumption expenditure pattern determine the physical and mental health of an individual. Even neoclassical economist consider consumption to be the final purpose of any economic activity and thus the level of consumption per person is viewed as a central measure of an economy's productive success. In macro economics, aggregate consumption determines aggregate saving and secondly consumption expenditure accounts for most of national output, understanding the dynamics of aggregate consumption expenditure is essential to understanding macroeconomic fluctuations and the trade cycle. In India, during post globalization era the per capita income has raised and that has significantly influenced its food consumption patterns by causing a change in the structure of food consumption items. The monthly per capita consumption expenditure on food items has declined from 72.83 per cent to 52.76 per cent and on non-food items has increased from 27.15 per cent to 47.24 per cent in the rural India during 1972-73 to 2011-12 (Deshmukh, 2018). India's consumer spending for 2020 was $1,621.12B, a 6.08 per cent decline from 2019. India's consumer spending for 2019 was $1,726.04B, a 7.71 per cent increase from 2018. Again it was for 2018 was $1,602.52B, a 2.92 per cent increase from 2017. In Assam, in recent years there is a significant increase in the level of consumption expenditure on both food items and non-food items. But the pattern of consumption among different social groups of the society is different. The growth of consumption is quite slow among the Schedule Tribe (ST) peoples (Basumatary, 2015). Consumption expenditure of

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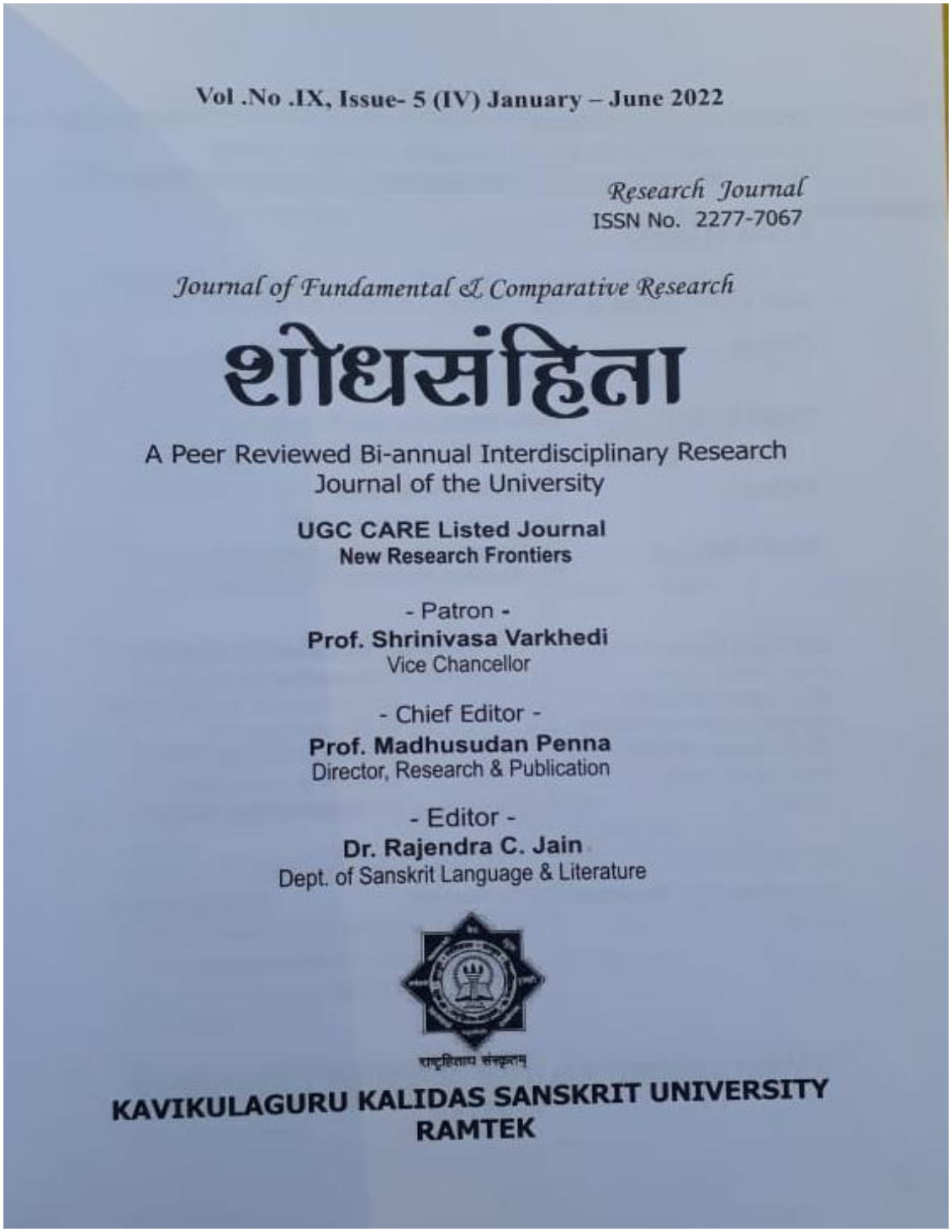

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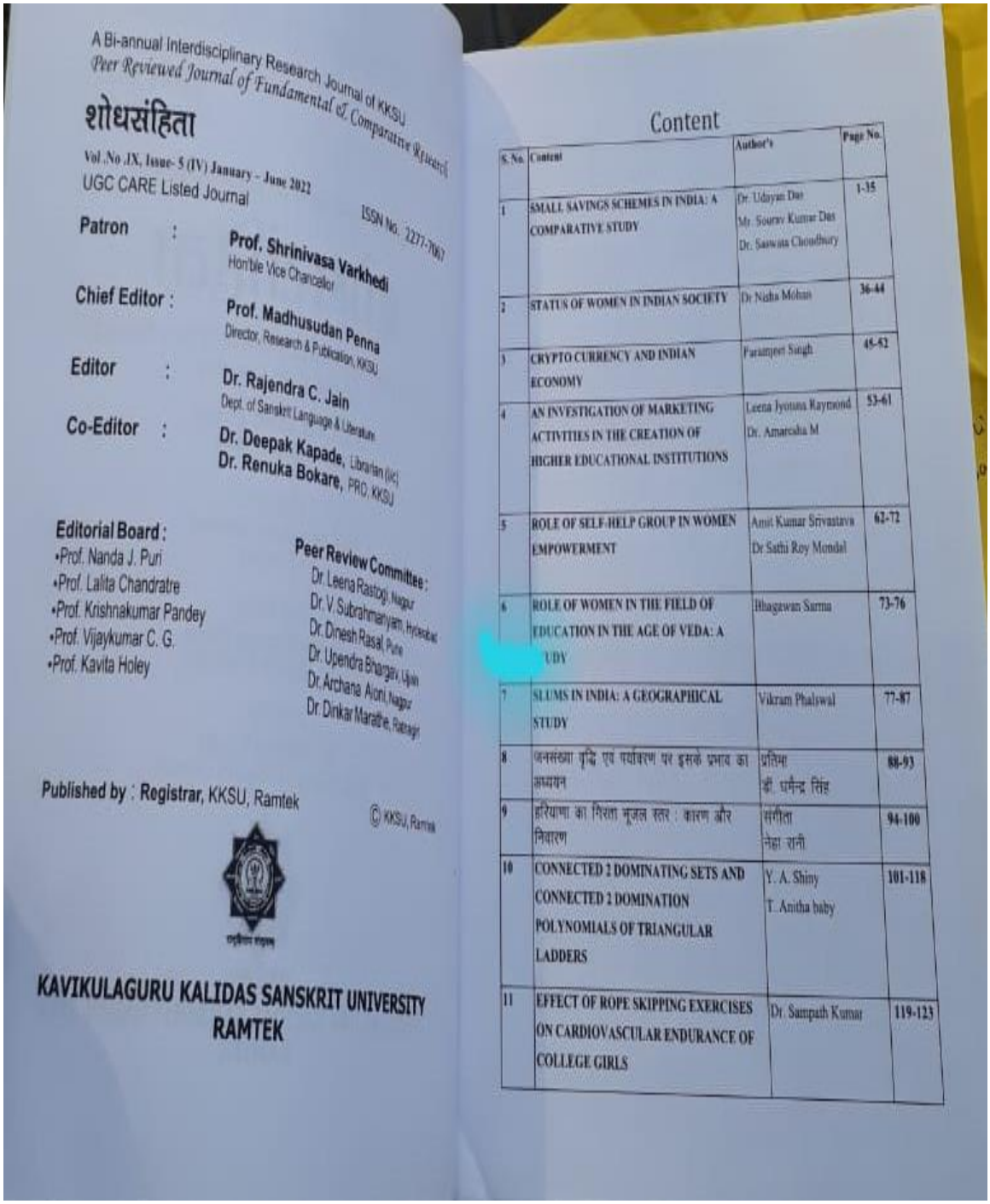

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BURNOUT AMONG THE GOVERNMENT AND PRIVATE SECONDARY SCHOOL TEACHERS IN RELATION TO THEIR ORGANIZATIONAL COMMITMENT

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Abstract:,
Teacher burnout is a phenomenon in which a teacher is overcome by frustration, a feeling of hopelessness and tiredness. Teacher burnout is a problem that affects teachers at all levels of instruction and can result early or late in the teaching career. The main purpose of this study is to examine the levels of burnout among the Government and private secondary school teachers in Kamrup District in relation to their organizational commitment. A Questionnaire based study was conducted on teachers working in the different schools of Kamrup District. Data were collected using burnout inventory and organizational commitment scale.
Key words: Burnout, School teacher, organizational commitment

Introduction

Teacher burnout is a phenomenon in which a teacher is overcome by frustration, a feeling of hopelessness and tiredness. The issue of teacher burnout is very important to schools and school systems. Teacher burnout is resulting from teacher's inability to protect themselves against threats to their self-esteem and well being. The problem of teacher burnout is universal. Scholar define teacher burnout as a condition caused by depersonalization, exhaustion and a diminished sense of accomplishment (Schwab et ai.1986).One of the most down to earth definition described teachers as no longer considering themselves professionals, rather just paid individuals. As burned out teachers negatively affect themselves, their students, and the educational system (Hughes, 2001), it is necessary to develop and promote the use of instruments to accurately measure teacher burnout. As a complement to teachers' reports on their own health, their students could give valid information about them, thus helping to discover burnout among teachers at an earlier stage and making timely preventive or restorative intervention strategies possible. Teachers play such a valuable role in helping our children grow up that any opportunity to promote their physical and mental health should be seized. Teachers who exhibit characteristics of being burned out are not effective in the classroom. They feel that they can no longer be responsible for the behaviour or learning of the students in their classroom. Burned out teachers are not effective in the classroom because "burnout who remains use significantly less task oriented behaviour and provide fewer positive reinforcements to their studies (Koon,).

One of the most important factors in today's knowledge world is the human resources of organization. It is not easy for top management to make employees committed to their organization, especially in the educational sector, where much of the work force uses their informational expertise in their daily activities. Organizational commitment is the most important factors to increase the added value of personnel to the organization. In educational organizations with lack of trust, employees accuse each others for any mistake, develop defense mechanisms, avoid taking responsibility, feel suspicious and jealous, make gossips, try to stay away organizational work and disaffirm organizational goals. Also

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