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CRITERIA 3
RESEARCH, INNOVATIONS AND EXTENSION
SUPPORTING DOCUMENTS FOR
3.3.1 Number of research papers published per teacher in the Journals as notified on UGC CARE list during the last five years

Summary Report

Year	2018-19	2019-20	2020-21	2021-22	2022-23	Total
Number	05	09	03	05	10	32

3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the last five years: 32 (Thirty two)

Title of paper	Name of the author/s	Department of the teacher	Name of journal	Calendar Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital		
						Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
2018-19								
Microstructural Charecterization of Cold Worked Lead (Pb) Powder by X-Ray Diffraction Line Profile Modelling	Ushasi Dutta	Physics	Journal of Physical Sciences	2018	2350-0352	https://jps.usm.my/	http://inet.vidyasagar.ac.in:8080/jspui/handle/123456789/2530	Yes
Slave Rotor Approach to Exciton Condensation in a Two-band System	Subhasree Pradhan	Physics	Journal of Physics Condensed Matter	2018	1361-648X	https://iopscience.iop.org/journal/0953-8984	http://doi.org/10.1088/1361-648X/aaee06	Yes
Two iconic woman in India	Shankhadip Maity, Chhatradhar De	English	AJKER JODHAN-WOMEN IN TEXT	2018	ISSN: 0871-5819	NA	NA	Yes
Voice of Silence! Portrayal of Benare in Tendulkar's Silence! The Courtis in Session	Priyanka Mukhopadhyay Basu	English	AJKER JODHAN	2018	ISSN: 0871-5819	NA	NA	Yes
Portrayal of Ursula as a New Woman by D. H. Lawrence	Priyanka Mukhopadhyay Basu	English	International Journal of Integrated Research and Development	2018	ISSN:2278-8670	https://www.ijird.org/	NA	Yes
2019-20								
A Concise Review on Pyridocoumarin/Azacoumarin Derivatives: Synthesis and Biological Activity	Prasanta Patra	Chemistry	ChemistrySelect	2019	online:2365-6549; print:2365-6549	https://chemistry-europe.onlinelibrary.wiley.com/journal/23656549	https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.201803596	Yes
Defects in Lithium niobate and its optical properties	Tapas Ghosh	Physics	IJRAR	2019	2348-1269	https://www.ijrar.org/	NA	Yes
Is Dengue A Sex Dependent disease	Nivedita Bhattachrya	Physiology	World Journal of Pharmaceuticls and Life Sciences	2019	2454-2229	https://www.wjpls.org/	NA	Yes
Sulphur dioxide ameliorates colitis related pathophysiology and inflammation	Krishnendu Sinha	Zoology	Toxicology	2019	Online ISSN: 1879-3185 Print ISSN: 0300-483X	https://www.sciencedirect.com/journal/toxicology	https://www.sciencedirect.com/science/article/abs/pii/S0300483X18306310?via%3Dihub	Yes
Bioactive polysaccharides from natural sources: A review on the antitumor and immunomodulating activities	Dilip Rout	Chemistry	Biocatalysis and Agricultural Biotechnology	2019	1878-8181	https://www.sciencedirect.com/journal/biocatalysis-and-agricultural-biotechnology	https://doi.org/10.1016/j.bcab.2019.101425	Yes
Solar Cell: A brief review on its journey from amorphous to perovskite	Ushasi Dutta	Physics	International Journal of Integrated Research And Development	2019	2278-8670	https://www.ijird.org/	NA	Yes
Competing Orders In An Extended Falicov-Kimball Model	Subhasree Pradhan	Physics	European Journal of Physics B	2019	2190-5444	https://epjb.epj.org/	https://doi.org/10.1140/epjb/e2019-100296-5	Yes
Lupeol alters viability of SK-RC-45 (Renal cell carcinoma cell line) bymodulating its mitochondrial dynamics	Krishnendu Sinha	Zoology	Heliyon	2019	Online ISSN: 2405-8440	https://www.sciencedirect.com/journal/heliyon	https://www.sciencedirect.com/science/article/pii/S2405844019357676	Yes
"Structural properties and isomerization of simple S-nitrosothiols: Ab initio studies with a simplified treatment of correlation effects"	Pradipta Ghosh	Chemistry	Mol. Phys.	2019	Online:1362-3028; Print:0026-8976	https://www.tandfonline.com/journals/tmph20	https://www.tandfonline.com/doi/full/10.1080/00268976.2019.1641639	Yes
2020-21								
Two-Magnon Bound State in the Kitaev Model in a [111]-Field	Subhasree Pradhan	Physics	Phys. Rev. B	2020	1550-235X	https://journals.aps.org/prb/	https://doi.org/10.1103/PhysRevB.101.180401	Yes
Gokshur Bhakta: taskarer jibon theke uttoroner ek loraiyer nam	Baishakhi Kundu	Bengali	Tabu Ekalabya	2020	0976-9463	NA	NA	Yes

Title of paper	Name of the author/s	Department of the teacher	Name of journal	Calendar Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital		
						Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
Structural Studies of Immunomodulatory (1-3), (1-4)-alfa-glucan from an edible mushrooms Polyporus grammocephalus.	Dilip Rout	Chemistry	International Journal of Biological Macromolecules	2020	Print ISSN:2365-6549	https://www.sciencedirect.com/journal/international-journal-of-biological-macromolecules	https://pubmed.ncbi.nlm.nih.gov/33220371/	Yes
2021-22								
The Synthesis, biological evaluation, and fluorescence study of chromeno[4,3- b]pyridin/ quinolin-one derivatives a backbone of natural product polyneomarline C scaffolds : a brief review	Prasanta Patra	Chemistry	New Journal of Chemistry	2021	Print ISSN: 0030-4948, Online ISSN: 1945-5453	https://pubs.rsc.org/en/journals/journal/nj	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=cf0brsgAAAAJ&citation_for_view=cf0brsgAAAAJ:KlAtU1dfN6UC	Yes
Solvent- and catalyst-free synthesis of 6H-chromeno[4,3-b]quinolin-6-ones	Prasanta Patra	Chemistry	Organic Preparations and Procedures International	2021	0885-6672	https://www.tandfonline.com/toc/uopp20/current	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=cf0brsgAAAAJ&citation_for_view=cf0brsgAAAAJ:WF5omc3nYNoC	Yes
Diverse synthesis of pyrrolo/indolo [3, 2-c] coumarins an isolamellarin-A scaffolds: a brief update	Prasanta Patra	Chemistry	New Journal of Chemistry	2021	Print ISSN: 0030-4948, Online ISSN: 1945-5453	https://pubs.rsc.org/en/journals/journal/nj	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=cf0brsgAAAAJ&citation_for_view=cf0brsgAAAAJ:QIV2ME_5wuYC	Yes
Hidden Fermi Liquidity and Topological Criticality in the Finite Temperature Kitaev Model	Subhasree Pradhan	Physics	Solid State Communications	2021	0038-1098	https://www.sciencedirect.com/journal/solid-state-communications	https://doi.org/10.1016/j.ssc.2021.114308	Yes
4-Chloro-3-formylcoumarin as a multifaceted building block for the development of various bio-active substituted and fused coumarin heterocycles: a brief review	Prasanta Patra	Chemistry	New Journal of Chemistry	2021	1144-0546, 1369-9261	https://pubs.rsc.org/en/journals/journal/nj	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=cf0brsgAAAAJ&citation_for_view=cf0brsgAAAAJ:_FxGoFyzp5QC	Yes
2022-23								
Neat synthesis of isothiazole compounds, and studies on their synthetic applications and photophysical properties	Prasanta Patra	Chemistry	New Journal of Chemistry	2022	1369-9261	https://pubs.rsc.org/en/journals/journal/nj	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=cf0brsgAAAAJ&citation_for_view=cf0brsgAAAAJ:roLk4NBRz8UC	Yes
"Relevance of constructivist theory in India-Bangladesh Land Boundary Agreemen (LBA)"	Sikandar Ansari	Political Science	IJARESM	2022	2455-6211	https://www.ijaresm.com/	NA	Yes
Fractionalized Kitaev Model in a Low Field along [111]	Subhasree Pradhan	Physics	Materials Physics Today, Proceedings	2022	2214-7853	https://www.sciencedirect.com/journal/materials-today-proceedings	http://doi.org/10.1016/j.matpr.2022.07.312	Yes
MINI REVIEW ON PYRIDO[2,3-c]COUMARINS BACKBONE OF SANTIAGONAMINE ANTIBIOTICS	Prasanta Patra	chemistry	HETEROCYCLES	2022	0385-5414	https://www.heterocycles.jp/	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=cf0brsgAAAAJ&citation_for_view=cf0brsgAAAAJ:Zph67rFs4hoC	Yes
A short review on the synthesis of pyrrolo[3,4-c]coumarins an isolamellarin-B scaffolds	Prasanta Patra	chemistry	Synthetic Communications	2022	1532-2432	https://www.tandfonline.com/journals/lsyc20	https://doi.org/10.1080/00397911.2022.2119413	Yes
(1)Signatures of regular black holes from the shadow of Sgr A* and M87*	Subhadip Sau	Physics	Journal of Cosmology and Astroparticle Physics (2) Physical Review D	2022	1475-7516	https://iopscience.iop.org/journal/1475-7516	https://iopscience.iop.org/article/10.1088/1475-7516/2022/09/066	Yes

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Biodiversity of Avifauna in Chilkigarh, Jhargram, West Bengal (India)	Sanjib Kumar Das, Koushik Sen	Zoology	World Journal of Environmental Biosciences	2022	2277-8047	https://environmentaljournals.org/	https://doi.org/10.51847/jNtkP7dkxS	Yes
A Brief Review on the Synthesis of Pyrrolo[2,3-c]coumarins, including Lamellarin and Ningalin Scaffolds	Prasanta Patra, Debnarayan Roy	chemistry	Organic Preparations and Procedures International UOPP	2022	36597; E:19455453	https://www.tandfonline.com/toc/uopp20/current	https://doi.org/10.1080/00304948.2022.2116909	Yes
4-Aminocoumarin Derivatives as Multifaceted Building Blocks for the Development of Various Bioactive Fused Coumarin Heterocycles: A Brief Review	Prasanta patra	chemistry	Current Organic Chemistry	2022	1385-2728	https://benthamscience.com/public/journals/current-organic-chemistry	https://doi.org/10.2174/1385272827666221209101112	Yes
A Short Review on the Synthesis of oxazolo/thiazolo/imidazolo coumarins and their biological activities	Prasanta Patra , Dilip Rout , Sanchaita Adikari	Chemistry	Synthetic Communication	2022	0039-7911 (print) 1532-2432 (online)	https://www.tandfonline.com/journals/lsyc20	https://doi.org/10.1080/00397911.2023.2199359	Yes

Journal Publication 2018-19

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Microstructural Characterization of Cold-Worked Lead (Pb) Powder by X-Ray Diffraction Line Profile Modelling

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ABSTRACT

Microstructural parameters for plastically deformed (hand-filed) and annealed lead (Pb) powders are investigated in terms of X-ray diffraction profile fitting analysis. Like the case of Pb-Bi binary alloy systems in α-phase the net deformation stacking fault probability is very small. The values of area averaged crystallite size and dislocation density is comparable with vapour deposited Pb film [3]. From modified W-A analysis the value of dislocation density (ρ) is found out to be of the order of 10^{15} m^{-2} and that from multiple whole profile (MWP) analysis is of the order of 10^{13} m^{-2}. A disagreement in case of cold-worked powders between MWP fitting of Fourier coefficients and modified W-A analysis is observed. Comparable to MWP procedure the modified W-A analysis provides a better result indicating the importance of dislocation microstructure in the analysis procedure. The type of dislocation is found to be predominantly of screw, $\langle 100 \rangle$ type dipoles for cold-worked and edge type in annealed powders respectively. The dislocation arrangement found to be more correlated in cold-worked powders compared to annealed powders.

Keywords: X-ray line profile analysis, Anisotropic Strain Broadening, Dislocation induced strain broadening, Dislocation contrast factor.

1. Introduction

The interpretation of X-ray diffraction pattern from deformed metals and alloys is the subject of research for the last few decades. The shift and broadening of X-ray diffraction lines has been related to changes in lattice parameter, presence of stacking and twin faults probabilities, residual stresses, small coherent domains, micro strains, compositional inhomogenieties, dislocations, etc. in the sample. The above parameters are generally related to some X-ray line profile parameters like peak FWHM (full width at half maxima), integral breadth, asymmetry, variance, centroid, Fourier transform, etc. Methods frequently used for analysis such as conventional Warren-Averbach (W-A) [18], Williamson-Hall (W-H) [20] method and peak-shift analysis method [17] provide information regarding one or more defect related parameters as described earlier [2,6]. But, all these methods suffer from certain simplifying assumptions. However, any interpretation about the microstructure of deformed materials is difficult from those

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Slave rotor approach to exciton condensation in a two-band system

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Abstract

We have studied exciton formation and condensation in an extended Falicov–Kimball model, going beyond the weak coupling approach, employing a semi-analytical technique: the slave-rotor mean-field theory (SRMF). In this essentially strong coupling theory, charge and spin (or orbital/pseudospin) degrees are treated as independent degrees of freedom, coupled by a local constraint. Using a two-site-extension of SRMF, we capture the effective many body scale beyond conventional mean-field theory. While the formation of excitons is favoured by the interband hybridization V, it is strongly influenced by the on-site Coulomb interaction U. Beyond a critical hybridization, there is condensation of excitons, leading to a transition from a metal to an excitonic insulator phase. Moreover, the behaviour of excitonic averages differs from the usual Hartree–Fock mean-field theory. Low-U results show that excitonic order parameter (Δ) is continuous across the transition both for single as well as two-site approximation, changing to weakly first order one at intermediate U for the later. The large-U limit shows a continuous transition for two-site analysis but remains first order in the single-site approximation. The slave rotor theory gives a mixed state of excitons and metal in both the analyses. We have also checked the effect of intersite correlation and localized band hopping on the exciton condensation.

Keywords: exciton, slave-rotor mean field, mean-field, strongly correlated, Falicov–Kimball model

(Some figures may appear in colour only in the online journal)

1. Introduction

The Coulomb screening between the conduction band electron and the valence band hole, under certain conditions, causes the formation of bound state leading to a non-conducting state: the exciton. This excitonic phase has been predicted theoretically for small, direct or indirect band-gap semiconductors or semi-metals in which the exciton binding energy is larger than the electronic band gap. In this case, excitons form spontaneously and can condense into a new insulating ground state. A plethora of theoretical and experimental work has been performed for decades to explore the physics of the excitons in a variety of systems [1–7] and still remains alive and engrossing [8–11]. This is due to their application potential and also a deep connection to the understanding of semiconductors [5], the charge density order via excitonic fluctuations in transition metal dichalcogenides [12], novel superconductors [13], electronic ferroelectricity [14–16] and so on.

In an idealised system where the number of electrons in the valence and conduction bands is separately conserved,

Shankhadip Maity and Chhatradhar De

TWO ICONIC WOMEN IN INDIA

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ABSTRACT : Now-a-days we all say men and women are equal but in our male dominating society theconcept deals with a lot of negative or positive reasons .M.K. Gandhi observes :' 'Man and woman are equalin status but are not identical .They are a peerless pair being complimentary to each other. Each helps theother ,so that with out the ... existence of their can not be concerned." Generally the women are g uidedforcefully what to do and how to do in their works with sentiment issues or religious issues etc. .In spite ofhaving all difficulties and preventions they sprout out their willingness with genuine qualities and fly withdreaming wings to the goal through their works in the society .They rank themselves by struggling life in theinternational leading iconic names. They shine themselves successfully in the society .We judge the womenas ' persons' not by women .They deserve ' Iconic Role Model' in India. Of them we can witness thehonorable names :Mahasweta Devi and Kamala Das. Those well known persons were born in the verypractical family . They confessed struggling ,difficulties ,prevention , harassment and deceit etc. to enter thesuccessful world .Their relentless , rigid ,insatiable, and revolutionary mentality reach ed them own kingdom.They snatched their right and became iconoclast and iconic figures .Today they all are worshiped by theworld. My paperdeals withtheoutstandingperformancesof Mahasweta Devi and Kamala Das.

KEY WORDS : Struggling , Revolutionary , Iconic , Women & Society.

INTRODUCTION: **Literature , a form of human expression , is the mirror of contemporary society that contains social, political, cultural and economical condition of human life . In other words, we can say that artists in general seldom hold a mirror to nature. William Shakespeare wrote in Henry IV that- "I'll call for pen and ink and write my mind". So the content of literature is as limitless. It represents the culture and tradition of a language or people. Literature always claims a superb power to guide and motivate the people, and these writings may take a serious participation as spokeperson. It is only over the last three or four decades that women's role in society given some explicit recognition. Previously the history of women's social life , their struggle for freedom from oppression for community rights and importantly for gender equality was largely ignored in history texts. Here in our text , we shall discuss about two iconic ladies, who raised their voice against social oppression, exploitation and the misuse of power. Their open and honest treatment of female sexuality, free from any sense of guilt, unending struggle for the rights and empowerment of the tribal people and deprived people marked them as an iconoclast in their generation. Aristotle asked a question – What makes great literature great? We may say it in a round about way that Kamala Das and Mahasweta Devi – both were exceptional in their category , and both of them made our literature truly great.**

DISCUSSION :

MahaswetaDeviwas born in 1926 in Dhaka .She was brought up by touching aliterary family as her father Manish Ghatak was a renowned poet and novelist. Her uncle was RithikGhatakwhose name enough to salute .Her mother Dharitri Devi was a writer and sacrificed her life as a socialworker whose brothers kept in the same line. She started her education in Dhaka ,EdenMonteswari schoolin 1930.she studied at Midnapore Mission Girls School in

1935. Next she went to Santiniketan 1936-1938).In this way she moved various school for taking education .She achieved B.A. (Hons) in Eng. at ViswaBHaratiUniversity and M.A. at Calcutta University.She got married renowned person ,Bijan Bhattacharya , a greatdramatist in 1947.Her son also is a great novelist and political critique whose name is Nabarun Bhattacharya.She got a second married with Asit Gupta after divorcing Mr. Bhattacharya in 1965. On july 2016 she tookher last breath.

Kamala Das was born in 1934 at Punnayurkulam in Malabar in Kerala . Both herparents were poets. So poetry was in her blood so to say .She was educated mainly at home and denied theadvantage of regular school and college education and it is again a point to be noted that she came of a veryorthodox family . Her maiden name was MadhaviKutty . She was married early enough at the age of fifteen.She had three sons M.D. Nalpat ,Chinnen Das and Jaysurya Das. She converted to Islam on December 11 ,1999.On 31 may 2009 aged 75 she died .

A COMPARATIVE STUDY OF MAHASWETA DEVI AND KAMALA DAS :

Mahasweta Devi was a Bengali fiction writer and socio political activist .' HajarChurashirMaa' , 'Rudali'and' AranyerAdhikar , etc renowned her name mostly .She composed over 100 novels and over 20 short storiescollections .' JhansirRani (1956) ' was her first novel .It was based on biography of the Rani of Jhansi ,'Rudali'centers on the two women developed a partnership for survival . It one of the hunting stories thatcome from a remote village in Rajasthan .'AranyerAdhikar'made her distinguished specially .For it sheachieved Akademi Award in 1979.Kamala Das's poetic collections are treasured with 'Summer In Calcutta' (1965), 'The Descendents'(1976), 'The Old Play House and other Poems'(1973),'Collected Poems'(1984).and 'The Best of KamalaDas'(1991)etc. .She was a bilingual writer like Kolatkar.She wrote her biography in prose to its little 'MyStory'(1975). She distinguished herself as an Indo-Anglian poet .She composed a few short stories such as'Frigidity and Speatained'. 'Photograph' vividly tells her personal experience , the theme of love and theemotional discontent. Her miscellaneous essays such as 'I Studied all Men' , 'What Women Expect out ofMarriage and what They Get, and 'Why Not More Than One Husband?' etc. .She also contributed to anumber of journals and literary magazines including 'Opinion' , 'The Illustrated Weekly of India' and 'Loveand Friendship' etc. .However her persona is no nymphomaniac . She is simply every woman who seeks love.She is the beloved and betrayed , expressing her endless female hungers, "the muted whisper at the core ofwomanhood .Her poetry was published in Europe in French,German,Swids,etc . .She brought a newphenomenon in Indo-Anglian poetry, a far cry indeed from TaruDutta or even Sarajini Naidu .

MAHASWETA DEVI'SSOCIO -POLITICALVIEW :Basically Mahasweta Devi dedicated her life for the rights and empowerment of Lodha and Shabar belongingto the tribal people of West Bengal, Madhya Pradesh, Bihar, Rajasthan, and Chhatisgarh of india. She taughtatVijaygarhJyotish Roy College in 1964. Then the institute was noted for working class women students.Later she studied the Lodha and Shabar and Dalit belonging to the tribal communities of India as a journalistand a creative writer.She voiced fluently for the brutal oppression on the tribal people.She showed thebitter experiences regarding untouchable by the powerful authoritarian upper castes,land lords, moneylenders and venal Govt. officials. She believed that ordinary people make real history. She tried to touch theheart of the common people. She got inspiration to write for those people who are exploited and used. Hervoice raised constantly against the discrimination, and the suffering tribal folks in India.Her great novel'AranyerAdhikar'(Right to Forest) was based on the biography of BirsaMunda who was the notable youngtribal freedom fighter.She also hoisted her strong hand against the industrial policy of the earlier communistparty of India(Marxist),Govt. of West Bengal.She took an active participation with the farmers of fertileagricultural land to protect justice against the earlier Govt. of West Bengal who almost deprived the farmersfrom their rights. She blessed MamataBanerjee'smovement which resulted a new era.She also ledNandigram and Lalgarhagitation.She had had a communist.

KAMALA DAS'S SOCIO -POLITICAL VIEW :Indian women poetry in English took a sudden turn with the ad vent of kamala Das by her greatpersonality. She was a confessional poetess who was renowned by her frank and truthful description ofman-woman relationship. She trimmed to core her verse with the inner state of human life. Her works arebased on mostly unorthodox and almost revolutionary as compared to the environment and atmosphere inwhich she grew up. Her married life was absolutely failure .She had to enter extra marital affair. Shebelieved in marriage as an emotional and spiritual bond. 'My story' her autobiography shows that had falleninlone with a man other than her lawfully wedded husband.

Her 'Introduction 'is an autobiographical poem vividly which is, confessional in tone and modern in style,blunt, bitter, and straight forwarded. It is also a poignant commentary on the position of women, gender,politics, powerequations, and the question of identity the canon of post colonial socio – cultural criticism.She highly concerned the politics...

'I don't know politics, but I know the names

Priyanka Mukhopadhyay Basu

Voice of Silence! : Portrayal of Benare in Tendulkar's *Silence! The Court is in Session*

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Emancipation of woman or the concept of new woman has been prominent subject of the critical milieu from the time feminism and gender-studies momentum. Feminism and Gender-Studies focus on two major aspects namely iss related to gender discrimination and oppression by patriarchal society, both of which challenged by the 'New Woman', being emancipated. Emancipation has taught the woman to educate herself, be economically self-dependent and raise voice to challe the traditional norms of society which degrades and disgrace their femininity. This been summed up in a nut shell by Moya Loyd: "Feminism conceived as a collect revolutionary politics aimed at the overthrow of patriarchy, at the dissolution oppress relation between the sexes and the construction of an alternative non-oppressive futur

In India a good woman is synonymous with a good wife and a caring moth As Veena Dass says "motherhood (is) considered a crucial factor in the shaping feminine identity".[2] She is one who maintains the yardsticks of decorum and propriety who does not raise her voice to question or challenge the rules set by Patriarchy. young woman belonging to middle class society in India is denied the privilege of liv a decent single life of her own or becoming a single mother. She is either treated a 'Goddess' for her heroic sacrifices or as a 'domesticated commodity' or as a sla working ruthlessly to bring smiles on everybody. She is never seen or portrayed a 'real' human being, having passion and lust for life. Writers seemed to have denied t fact that woman too wants, desires, feels just like a man does. In a patriarchal soci she cannot and should not express her sexual wants. Simone de Beauvoir in her *Second Sex* states that a woman "has no right to any sexual activity apart fro

Priyanka Mukhopadhyay Basu

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Portrayal of Ursula as a New Woman by D.H. Lawrence

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Abstract:

It has been remained a point of immense interest to explore literary as well as social issues centering the womanhood sketched by the great eighteenth century English novelist and poet D. H. Lawrence. Lawrence, with his own experience and prolific eyes, could create a new womanhood who were ahead of time by upholding feminism against the then tradition. These new women as emerged after tussle with tradition can redefine feminism by virtue of being enlightened than just remaining bound in house hold lives and mindset of working and middle class women. She is one who is inclined to follow her instincts and sexual loyalties rather than the pattern of conventional behaviour. In Lawrence's canvas women are presented as psychologically more complex than their male counter parts. The Rainbow traces the history of three female generations of the Brangwens, a farming family of Derbyshire, namely Lydia Lensky, her daughter Anna and finally Anna's daughter Ursula. Ursula can be identified as the first feminist heroine in English novel. She comes out of the ways of society and normal relationship and knows how to affirm her identity as a woman. Lawrence himself opines that the germ of The Rainbow and Women in Love is woman becoming individual, self responsible and taking their own initiative and finally emerging as the New Woman.

Keywords: *Womanhood, Feminism, New Woman, Enlightenment, Emancipation.*

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1. Introduction: The concept of New Woman

D.H. Lawrence's novels centre around female protagonists. It is striking that most Lawrence's fictions like *The Rainbow*, *Women in Love*, *The Lost Girl*, *The Plumed Serpent*, *Lady Chatterley's Lover* portray the experience of women who can be termed as "New Woman", compared to their earlier counterparts who had mainly engaged themselves in washing up the dishes and putting children to bed. To some extent the 'New Woman' is one who had successfully broken or try to break the traditionally house

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ChemistrySELECT Reviews

Organic & Supramolecular Chemistry

A Concise Review on Pyridocoumarin/Azacoumarin Derivatives: Synthesis and Biological Activity

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Coumarins are important due to their versatile bio-activity. Synthesised pyridocoumarin derivatives show remarkable biological activities including antifungal, antibacterial, antitumor, antiHIV, and antimicrobial activity. The present review aims to review a vast body of literature on different synthetic methodology mainly aza-Diels Alder reaction, metal catalyzed cyclization and multicomponent reaction and bioactivity of pyridocoumarin derivatives as published during the period from 1997 up to 2017. The synthesised compounds have been reported in literature either by construction of pyridine, pyran or of both ring starting from suitable precursors.

1. Introduction

Among a host of natural products studied, the central structure of the coumarins and their derivatives are seen to be the pivotal constituents of a plethora of natural products that demonstrate remarkably vital biological functions.[1–3] Certain derivatives of coumarin that the nature produces are seen to be fused to other cyclic moieties like benzene, naphthalene, benzopyran, or furan exhibit novel biological roles[4–6] that include anti-tumour and anti-microbial activities. To illustrate, psoralen[7a] and angelicin,[7b,c] which are coumarin fused furan derivatives, are commonly used drugs for the treatment of skin problems like psoriasis, eczema and vitiligo.[7d] Another interesting property showed by coumarin fused systems is their fluorescence.[7e,f,g] Lamellarins and related pyrrole derived alkaloids isolated from diverse marine organisms constitutes another class of pyrrole fused coumarin derivatives which are well known for their remarkable biological activities including multidrug resistance reversal activities, antitumor activity, antioxidant activity, cytotoxic activity cell division inhibition and immunomodulatory activity.[8] On the otherhand pyridine constitute is also important for their biological interests.[9] Vitamin B6, nicotine, or oxido-reductive NADP-NADPH coenzymes contain pyridine moiety. Synthesised pyridine derivatives show attention-grabbing bioactivity such as anti-inflammatory, anti-depressant and anti-HIV activity. The coumarin derivatives fused with azaheterocycles specially the pyridine nucleus have been reported to possess antiallergic,[10a] antidiabetic[10b] and analgesic[10c,d] properties. Santiagonamine (Figure 1a) is a natural pyridocoumarin.[11] It was observed to exist in the stems and branches of Berberisdarwinii Hook which is a shrub that abounds in South America. Santiagonamine have been found to possess wound-healing properties. Goniothaline

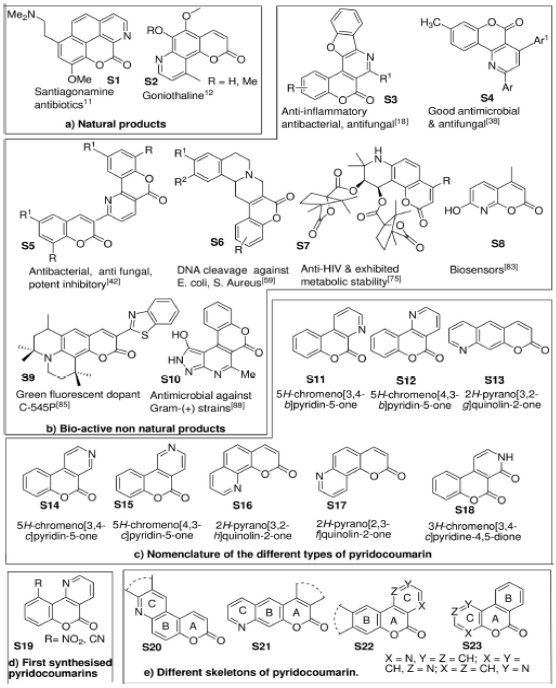

Figure 1. Natural, nonnatural pyridocoumarin derivatives with bio-activity and their nomenclature.

[12] is also a natural pyridocoumarin alkaloid isolated **from the Australian rainforest plant** Goniothalamusaustralis. Goniothaline (Figure 1a) shows antimalarial activity against a chloroquine-sensitive Plasmodium falciparum line (3D7). Coumarin fused pyridine derivatives have been reported to possess antihypertensive activities[13] as well as anti-HIV activity.[14] Chromenoquinoline derivatives have been used as drugs that modulate

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Defects in Lithium Niobate and Its Optical Properties

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Abstract: Defects in congruent lithium niobate (CLN) single crystal were discussed in this review. Intrinsic defects mean empty site of lithium (Li) ion, oxygen ion and niobium antisites in CLN. These are explained by the polaron model. Vacant Li or Nb ions in CLN are replaced by doping impurities such as Mg, Fe, Cu, Ti and Ni etc. These are called extrinsic defects. Its optical properties depend on these defects. Recent progress of optical properties of lithium niobate, such as photorefractive, piezoelectric, optoelectric and nonlinear optic properties are focused on it. Saturation birefringence change with laser intensity in CLN due to photorefractive effect was investigated and a nonlinear relationship between them is obtained. A relationship between Curie temperature and Li content has been established for lithium niobate that bears a ferroelectric nature. A similar relationship is also found to exist in the case of Mg doped lithium niobate. Extraordinary refractive index change due to Li in diffusion is estimated.

IndexTerms - $LiNbO_3$, Defects, Congruent, Polarons, Optical properties.

I. Introduction

Lithium niobate (LN) is a typical compound of variable composition [1]; its structure is normally characterized by a high concentration of inherent defects. Defects in $LiNbO_3$ are categorized in two types, intrinsic and extrinsic. Intrinsic defects are due to the vacancies of Li ions, oxygen ions and niobium antisites. This defect enables to guide the wave by total internal reflection [2]. Lithium niobate is technologically essential material due to its optical properties which strongly depend on intrinsic and extrinsic defects. Its photorefractive effect is due to extrinsic defect of iron. This type of defect is also responsible for photoconductivity and photovoltaic current. It is also used for nonlinear optical frequency conversion. It has lot of application in photonic devices such as optical waveguides, electro-optical modulator, surface acoustic wave devices, holographic data storage devices and directional coupler based on waveguides. Now a days periodically poled lithium niobate crystal is used for optical parametric oscillators which is used to generate tunable laser [3] as well as quasi phase matching (QPM) bulk interaction largely expand to parametric amplifier [4]. As the modern era is the nanoscience and nanotechnology, microscale and nanoscale photonics devices based on LN thin film were developed. Recent advances in integrated LN platform are nonlinear optics in LN nanophotonic structures [5] like nano waveguide, photonic wire and photonic integrated circuit.

II. Congruent Lithium Niobate

Lithium niobate is a single crystal oxide material with rapidly growing usage in photonics industry due to its electro-optic, pizoelectric, ferroelectric, acousto-optic, and nonlinear-optic propertics. There are several methods for fabrication of lithium niobate, such as Bridgman, Verneuil, flux, Stepanov, and Czochralski growth methods. Out of these methods Czochralski growth technique is most important for single crystal fabrication from melts, because of its larger control on the composition of fabricated single crystal. Lithium niobate single crystal is first time grown in 1949 by Matthias et.al [6] to study its ferroelectric propertics. On the basis of composition ratio in $LiNbO_3$ single crystal can be classified in two group, one stoichiometric and another congruent. If lithium and niobium concentration ratio ($\frac{[Li]}{[Nb]}$) is 1 then it is called stoichiometric $LiNbO_3$ crystal. Where as, if the lithium and niobium concentration ratio is 0.94 the material is called congruent. The corresponding oxide concentrations are $\frac{[Li_2O]}{[Li_2O]+[Nb_2O_5]}$ = 48.34 mol % and $\frac{[Nb_2O_5]}{[Li_2O]+[Nb_2O_5]}$ = 51.66 mol % , for congruent lithium niobate crystal. For waveguide based integrated optic devices mostly congruent $LiNbO_3$ crystal is used.

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IS DENGUE A SEX DEPENDENT DISEASE – A DEMOGRAPHIC REPORT AT JHARGRAM BELT, WEST BENGAL IN 2017-18

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ABSTRACT

Dengue fever is a viral infection and is serious health problem worldwide particularly in Asian countries including India. It is an autoimmune disease which is caused by the vector *Aedes aegypti* giving NS-1 and IgM positive test. Besides this, other environmental factors and many host factors are also involved in its rapid transmission. A demographic study report on dengue fever at Jhargram belt in West Bengal, India, in 2017 – 18, revealed the predominance of suffering in male than female. It was also severe in age group between 20-40 years. In the second stage the other victimized group was 0- 10 years. The biochemical reports in males also showed higher level of SGPT, IgG and IgM level. The ESR level was higher in female but total leucocyte count was higher in male. The collected reports favour the possible assumption on dengue as an male dominant autoimmune disease. But the exact mechanism is still obscure. In future we should find out whether it is truly sex dependent like few other diseases i.e. diabetes mellitus, grave's disease, systemic lupus erythematosus etc. and how is genetically interrelated.

KEYWORDS: Dengue, India, Male, IgG, IgM, SGPT.

INTRODUCTION

In the second half of twentieth century, Dengue is a major public health concern in many tropical and subtropical countries in the world. It is a mosquito - born viral disease. It is now a major global threat as claimed by WHO.[1] The dengue virus (DENV) infection causes a broad spectrum of clinical presentations, with asymptomatic, mild or nonspecific fever. The severe presentation cases with haemorrhagic fever (DHF) or dengue shock syndrome (DSS). The survey reports at different times, encourage the prevalence of male gender and the specific age groups.[2,3,4]

There are four closely related DENV serotypes (DENV – 1 TO 4). DENV-1 was first isolated by Ren Kimura and Susumu Hotta in Japan in 1943.[5] An epidemic of Dengue Fever involving at least 200,000 cases had occurred between 1942 and 1944 during World War II in Japanese port cities such as Nagasaki, Kobe, and Osaka.[6] The infections originated from persons returning from the tropics, in particular Southeast Asia and the Pacific islands. A few months after the first isolation of DENV-1 in Japan, Albert Bruce Sabin and Walter Schlesinger isolated DENV-1 from Hawaiian and shortly thereafter, DENV-2 from Papua New Guinean samples by Sabin and Schlesinger, 1945.[7] They demonstrated that these viruses were antigenically related, yet distinct, and they could be distinguished by the hemagglutination inhibition (HI) assay. In the late 1960s, dengue haemorrhagic fever (DHF) fatality has been reported by Sumarmo et al.,1987 to be as high as 41.3% when healthcare providers understandably were still unfamiliar with the disease.[8] Today, DHF fatality rates can exceed 20% without proper treatment, but can be brought down to 1% with proper medical care according to WHO report, 1997.[9] Although there were various speculations about the earliest description of dengue-like diseases in historical accounts.[10,11] The disease now known as DHF was first recognised in Manila, the capital of Philippines in 1953.[12] Viruses similar to DENV-1 and DENV-2 were isolated from Manila patients in 1956 by William Hammond and were called DENV-3 and DENV-4.[13] Dengue viruses of multiple serotypes were subsequently isolated by Hammond et. al, 1960, from patients of another DHF epidemic in Bangkok and Thailand in 1958.[14] It is now reported that all four serotypes of dengue virus can cause DHF. Halstead in 1980, reported that DHF/DSS outbreaks were mainly restricted to Southeast Asia until the early 1980s.[10] Since then, dengue transmission has intensified and DHF/DSS outbreaks are now frequent in

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Dilip Rout

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Bioactive polysaccharides from natural sources: A review on the antitumor and immunomodulating activities

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ABSTRACT

Polysaccharides are a structurally diverse group of biological macromolecules of well-known occurrence in nature. The mushroom, plant and other polysaccharides draw a lot of attention due to their several difficult biological properties, such as, anticancer, antiviral, immunomodulating, antimicrobial, anticoagulant, antidiabetic, antioxidant, and antitumor activities. Several bioactive glucans and heteroglycans were isolated from different mushroom, plant and bacterial cell wall. Polysaccharides have highest ability for carrying biological information comparison with other biopolymers such as proteins and nucleic acids due to the structural variability. It is the focus of this review to bring together the available knowledge of the structure, and function of the different polysaccharides of the mushroom, plant and bacterial cell wall.

1. Introduction

The great bulk of the carbohydrates in nature are present as polysaccharides, which have relatively large molecular weights (Maity et al., 2014a, 2015; Xu et al., 2016). Polysaccharides have been produced as the first biopolymer on Earth (Tolstoguzov, 2004). These biopolymers are complex carbohydrates and made up of monosaccharides joined together by glycosidic linkages (Maity et al., 2014b; Nandi et al., 2014; Shakhmatov et al., 2016). Their structures may be linear or they may contain various degrees of branching (Bhanja et al., 2013; Manna et al., 2017; Patra et al., 2012a). The high structural diversity reflects the functional diversity of these molecules (Maity et al., 2017; Meng et al., 2014; Wang et al., 2016). There is a clear correlation between allowed conformations and linking pattern (Li et al., 2018). For example, the chains in amylose tend to adopt single coiled helical (D.E.C. Cambridge, 2013) conformations while some (1 → 3)-, (1 → 6)-β-D-glucan chains adopt triple helical (Giese et al., 2013) conformation.

Polysaccharides exist in an enormous structural diversity as they are produced by a vast variety of species; including microbes, algae, plants, and animals (Denman and Morris, 2015; Ji et al., 2003; Ghorai et al., 2009; Kanagasabapathy et al., 2011; Li et al., 2017a; Wu et al., 2006). They are able to offer the highest capacity for carrying biological information because they have the greatest potential for structural variability (Liu et al., 2014; Popov et al., 2007). Polysaccharide related technologies have played a leading role in the development of a wide range of products that include foods, pharmaceuticals, textiles, papers and biodegradable packaging materials (Licht et al., 2010; Wu et al., 2016a,b). The medicinal properties of mushrooms and plants have been confirmed through an intensive research conducted worldwide (Fan et al., 2012; Jiang et al., 2015; Oliveira et al., 2019). Different type of antioxidant, antitumor and immunomodulating polysaccharides were isolated from edible mushrooms, bacterial cell wall, and plants ((Bhanja et al., 2012; Feng et al., 2016; Mandal et al., 2015; Patra et al., 2012b; Patra et al., 2013; Smiderle et al., 2008; Siu et al., 2016). These polysaccharides do not directly attack to the cancer cells. They generate their antitumor effect indirectly, through stimulation of various defensive

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Ushasi Dutta

Paper Id: IJIRD/30/V-1/June/19 Volume: 1/Issue: 15/June 2019-ISSN: 2278 8670

Solar cell: A brief review on its journey from amorphous to perovskite

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Abstract:

Converting solar energy into a clean, practical alternative power source will require highly efficient and inexpensive devices that generate electrical power from solar irradiation. Scientists have categorized solar cell into three different part.(i) first generation solar cell which include single crystalline and polycrystalline solar cell, (ii) second generation solar cell comprising of amorphous silicon solar cell and (iii) third generation solar cell fabricated with dye-sensitised solar cell, organic photovoltaic, quantum dot and perovskite solar cell. In this article, a brief review of different types of solar cell on its evolution and progress is discussed.

Keywords: *Conservation, cell, energy, power, solar.*

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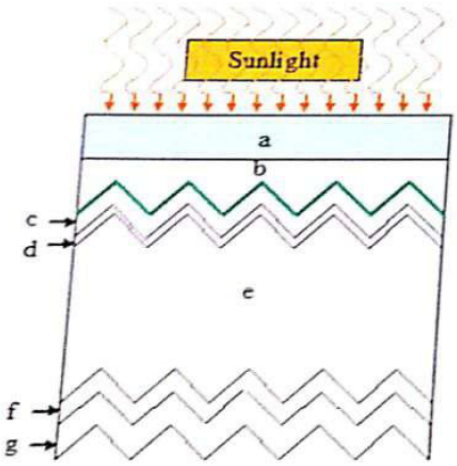
1. Amorphous hydrogenated silicon solar cell

In order to make solar photovoltaic (PV) systems economically viable for large-scale power generation needed for different applications, we must first choose a low cost material that can be deposited over a large surface. Secondly, the solar cell fabricated from such a material must have a



a: glass, b: textured TCO, c: P-a-SiC:H, d: buffer layer, e: I-a-Si:H, f: N-a-Si:H, g: reflector metal

Cell output parameters:

Short-circuit current density J_{sc}, Open-circuit voltage V_{oc}

Efficiency □= (Maximum power output (P_{max})/Power input) x 100%

Fill-Factor FF =(P_{max}/J_{sc} x V_{oc})

Fig. 1. Schematic diagram of a single junction cell

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THE EUROPEAN PHYSICAL JOURNAL B

Regular Article

Competing orders in an extended Falicov-Kimball model

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Abstract. We study the interplay between superconducting pairing, exciton and charge-density wave in a correlated electron model, the Falicov-Kimball model, extended by a hybridization term between spinless fermions and also by an attractive pairing in the particle channel. A self-consistent Hartree-Fock BdG mean-field calculation shows that the hybridization V and Coulomb repulsion U favour in binding an exciton but both are detrimental to the formation of superconducting pairing, whereas, CDW is favoured by Coulomb interaction and disfavoured by V. There is a coexistence regime for superconductivity, CDW and excitonic order in the parameter space.

1 Introduction

The problem of exciton (Coulomb-bound electron-hole pairs) [1–4] in correlated systems is an active area of research, necessitated by new experiments on a variety of systems where electronic correlation in certain situations conducive to strong charge fluctuations have been found to lead to excitonic instability condensing eventually into either charge density or superconducting order. BCS Superconductors require a bosonic glue to form Cooper pairs, and phonons generally play this role. On the other hand, there are proposals of exciton-mediated superconductors, condensation of the excitons themselves, especially in the case of imbalanced electron-hole densities could increase the probability of electron–electron pairing. Exciton is considered to provide stronger binding and higher critical temperature by the density of bosonic quasi-particles in the condensate [5]. But it is still debatable whether exciton-mediated superconductivity (SC) is truly possible or not, especially within the cuprate family. There are several proposals of systems for the experimental realization of SC via exciton, e.g, metal-semiconductor interface [6], transition metal dichalcogenide monolayers [7], semiconductor microcavities [8] and exciton-polariton mediated SCs [9,10] to maximize the coupling between free electrons and excitons. Light can be used to tune phase relation in cuprate high-T_c superconductors [11] and light also serves for the generation of crystal excitations similar to excitons that help electron–electron pairing. There are theoretical description on the possible occurrence of excitonic order and SC in the two-orbital Hubbard model with intra- and inter-orbital Coulomb interactions [12]. A two-band Hubbard model with attractive pairing shows that SC gap decreases with increasing hybridization [13]. It has also been shown that k-independent hybridization is detrimental to intra-band SC. On the other hand, there are reports that antisymmetric (k-dependent) hybridization enhances SC pairing, the emergence of an (inter-band) induced p-wave gap due to the hybridization between two single bands [14–16]. Therefore, previous works suggest that exciton can play both the roles; it can be a plausible source of electron pairing and also can be regarded as detrimental factor for SC pairing formation and condensation.

The competition between exciton and SC and other orders has been revisited in this present work using a prototypical correlated model, the Falicov-Kimball model (FKM). The original FKM [17] introduced in 1969 to describe valence or semiconductor-insulator transition in some transition metal oxides, has been used beyond its original motivation. This model has been successful in explaining correlation effects [18–20], viz. metal-insulator transition in a host of systems, mixed-valence phenomena, the formation of ionic crystals and the charge-density waves (CDW). The CDW in transition metal dichalcogenides has been discussed in the framework of excitonic mechanisms: a fluctuating preformed excitonic liquid condenses at the CDW transition. In the weak-coupling limit, the magnitude of the single-particle gap is almost comparable to that of the excitonic order parameter. This indicates that electron-hole pair formation and condensation may occur concomitantly, such as the Cooper pair formation and condensation in BCS theory. Excitonic correlations were also used to explain lattice deformation in Kondo insulators and more recently were taken into account to study SC in a mixed-valent system. Due to the fact that the importance of excitons is well established by these findings, it is desirable to study the competition

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Lupeol alters viability of SK-RC-45 (Renal cell carcinoma cell line) by modulating its mitochondrial dynamics

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ABSTRACT

Renal cell carcinoma (RCC) is the most common kidney cancer leading to 140,000 deaths per year. Among all RCCs 80% evolve from the epithelial proximal tubular cells within the kidney. There is a high tendency of developing chemoresistance and resistance to radiation therapy in most RCC patients. Therefore, kidney resection is considered as the most effective treatments for patients having localized RCC. There is a high tendency of post-operative recurrence among 20–40% of the patients and this recurrence is not curable. It is also clear that modern medicine has no curative treatment options against metastatic RCC. Lupeol [lup-20(29)-en-3β-ol] is a pentacyclic triterpenoid compound naturally found in various edible fruits and in many traditionally used medicinal plants, and has been demonstrated as effective against highly metastatic melanoma and prostate cancers. The present study was designed to evaluate the effect of lupeol to RCC with molecular details. Treatment with lupeol on SK-RC-45 (a RCC cell line) with the LC_{50} dose of 40μM (for 48 h) induces mitochondrial hyper fission which eventually leads to apoptosis while SK-RC-45 counteracts by enhancing autophagy-mediated selective removal of fragmented mitochondria. This is the first study which concurrently reports the effects of lupeol on RCC and its effect on the mitochondrial dynamics of a cell. Herein, we conclude that lupeol has potential to be an effective agent against RCC with the modulation of mitochondrial dynamics.

1. Introduction

Renal cell carcinoma (RCC) is the most common kidney cancer with over 350,000 cases reported annually, causing 140,000 deaths per year [1]. This cancer is reported to be the third leading cause of death for urological tumors [2]. Among various subtypes of RCC, the clear cell tumor subtype accounts for 80% of all RCCs. Epithelial proximal tubular cells are the origin place of this tumor within the kidney, with some instances also representing additional tubular origin [3]. RCC is a pervasive malignancy where one out of five patients having advanced stage already during diagnosis and 30 % of the patients diagnosed with localized tumor develop metastases, even after removal of the parent tumor [3]. Once metastasis is reached, survival rate is 20% up to 5 years and average survival time is nearly one year [4]. Despite of various therapeutic options, proposed outcome of patients with locally advanced tumors or metastatic tumor remains poor [3]. There is a high tendency of developing chemoresistance and resistance to radiation therapy in most RCC patients. Therefore, kidney resection is considered to be the most effective treatments for patients having localized RCC [3]. The postoperative recurrence in RCC patients is around 20%–40% and it is rarely correctable [5]. Thus, there is an obvious necessity to advance treatment options for metastatic RCC [6]. Recently developed remedies targeting vascular endothelial growth factors, platelet growth factors, mammalian target of rapamycin, receptor tyrosine kinases have been reported to show comparatively longer progression-free survival with respect to standard care [7,8], however, the results are still far from being conclusive. For

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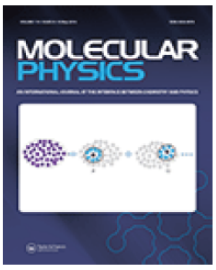

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Structural properties and isomerisation of simple S-nitrosothiols: *ab initio* studies with a simplified treatment of correlation effects

Shovan Manna, Suvonil Sinha Ray, Pradipta Ghosh & Sudip Chattopadhyay

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Rapid Communications

Two-magnon bound states in the Kitaev model in a [111] field

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It is now well established that the Kitaev honeycomb model in a magnetic field along the [111] direction harbors an intermediate gapless quantum spin liquid (QSL) phase sandwiched between a gapped non-Abelian QSL at low fields $H < H_{c1}$ and a partially polarized phase at high fields $H > H_{c2}$. Here, we analyze the low-field and high-field phases and phase transitions in terms of single- and two-magnon excitations using exact diagonalization and density matrix renormalization group methods. We find that the energy to create a bound state of two-magnon Δ_p becomes lower than the energy to create a single spin flip Δ_s near H_{c2}. In the entire Kitaev spin liquid, $\Delta_p < \Delta_s$ and both gaps vanish at H_{c2}. We make testable predictions for magnon pairing that could be observable in Raman scattering measurements on Kitaev QSL candidate materials.

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I. INTRODUCTION

Quantum spin liquids (QSLs) have generated significant excitement because of their potential applications for topological quantum computation. In QSLs, magnetic order is suppressed by quantum fluctuations, hence they cannot be described within the traditional Landau theory of symmetry breaking which is based on the existence of a local order parameter. Instead, the concept of topology plays a central role in the study of QSLs. QSLs are characterized by long-range entanglement, multiple degeneracy of the ground-state, fractionalized quasiparticles, and the existence of topological order [1–6].

The Kitaev spin-1/2 model on the honeycomb lattice [7] is the paradigmatic example for a QSL because of its unique combination of exact solvability hosting a variety of gapped and gapless QSL phases [8–13] and for having experimental relevance [14–22]. It is described by

$$H_K = \sum_{\gamma=x,y,z} K^\gamma \sum_{\langle ij\rangle_\gamma} S_i^\gamma S_j^\gamma, \tag{1}$$

where we take the interaction parameter K to be antiferromagnetic ($K^\gamma > 0$). The pairwise nearest-neighbor Ising spin interactions are bond ($\gamma = x, y, z$) dependent between sites i and j [Fig. 1(a)]. The isotropic antiferromagnetic (AFM) Kitaev model ($K^x = K^y = K^z = 1$ eV) has a topologically nontrivial gapless QSL ground state. Following Kitaev's original solution, each spin-1/2 can be split into four Majorana fermions: three are associated with the bonds and one with the original site. The bond Majoranas can be recombined to form a static Z_2 gauge field, leaving a single free Majorana fermion moving in a background of Z_2-gauge fields. The Majorana spectrum is gapless with Dirac points located at the K/K' points of the Brillouin zone, yielding a gapless Z_2 Kitaev spin liquid (KSL) [7,8].

In this Rapid Communication, our main goal is to obtain the effect of a magnetic field on the magnetic excitation spectrum. As shown schematically in Fig. 1(b), we have previously discovered two transitions between a gapped KSL and a gapless $U(1)$ QSL at H_{c1} and a second phase transition between the gapless $U(1)$ QSL and a partially polarized magnetic (PPM) phase at H_{c2} [9,10]. We choose to use the hard core boson (HCB) representation [23] to describe the $S = 1/2$ operators to describe the gap closing at the critical fields in the familiar language of multimagnon excitations. Our main contribution is the calculation of the dynamical one- and two-particle spectra as a function of the magnetic field from which we extract the gap scales as shown schematically in Fig. 1(b). The one-particle gap Δ_s is the energy cost for creating a spin-flip (SF) or a magnon excitation with a change in the spin quantum number $\Delta S = 1$. The two-particle gap Δ_p, the main result of our paper, is the energy cost of creating two SFs or a two-magnon bound state.

II. KITAEV MODEL IN A MAGNETIC FIELD ALONG [111]

The isotropic AFM Kitaev model with an external magnetic field applied in the [111] direction is defined by adding $-\mathbf{H}\cdot\sum_{i\gamma}\mathbf{S}_i{}^\gamma$ to the Kitaev Hamiltonian in Eq. (1), where $\mathbf{H} = H(\hat{e}^x + \hat{e}^y + \hat{e}^z)$ is perpendicular to the 2D honeycomb plane with equal projections along the bond directions $\{\hat{e}^x, \hat{e}^y, \hat{e}^z\}$.

We use density matrix renormalization group (DMRG) [24–31] to directly simulate the interacting spin model and exact diagonalization (ED) to evaluate the spectrum of the HCB model. The dynamical spectra are obtained using Lanczos on small clusters [27,32]. Overall, the combination of the spin and HCB representations provides useful insights.

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...র ভক্তা : তস্করের জীবন থেকে উত্তরণের এক লড়াইয়ের নাম

বৈশাখী কুণ্ডু

...তা দেবী একসময় আক্ষেপ করে বলেছিলেন—

> আদিবাসী সমাজব্যবস্থা, মূল্যবোধ, সংস্কৃতিচেতনা, সভ্যতা —সব মিলিয়ে যেন নানা সম্পদে শোভিত এক মহাদেশ। আমরা, মূলস্রোতের মানুষেরা, সে মহাদেশকে জানার চেষ্টা না করেই ধ্বংস করে ফেলেছি, তা অস্বীকার করার পথ নেই।[১]

...সী জীবন, সমাজ, সংস্কৃতির প্রতি মূলস্রোতের মানুষের শুধু উদাসীনতা নয়, দীর্ঘকাল ...জ করে চলেছে শোষণ ও বঞ্চনাও। স্বাধীন ভারতেও এই ধারা অব্যাহত। রাষ্ট্রীয় ...পরিকাঠামোর মধ্যেও নিম্নবর্ণ ও আদিবাসীদের প্রতি ঘৃণার যে চোরাস্রোত সমাজের ...লে প্রবাহিত হয়ে চলেছে তার আঁচ বিভিন্ন সময়েই পাওয়া যায়। চুনি কোটাল বা ...ভেমুলার ঘটনা সেই আঁচকে তীব্র করে তোলে কখনও কখনও। নতুবা সমাজে ...ই চিন্তনে, কথনে বা নির্যাতনে উচ্চবর্ণ, মূলস্রোত কর্তৃক এই ঘৃণার শোষণ চলতে ...লোধা-শবরদের প্রসঙ্গক্রমে মহাশ্বেতা দেবী লিখেছিলেন—

> মেদিনীপুরের লোধা ও পুরুলিয়ার খেড়িয়াদের এক সময় অপরাধপ্রবণ আদিবাসী হিসেবে চিহ্নিত করা হয়েছিল; পরে যদিও তা প্রত্যাহার করে নেওয়া হয়। কিন্তু এখনও সমাজ, প্রশাসন ও পুলিশের চোখে এরা অপরাধী। পশ্চিমবঙ্গ ও বিহারের নানা জেলখানায় বিনা অপরাধে যে কতজন খেড়িয়ার জীবন শেষ হয়ে যাচ্ছে তা কেউ কোনোদিন খতিয়ে দেখেনি। কলাই বাহুল্য যে আদিবাসীদের বিশেষত সংখ্যালঘু গোষ্ঠীগুলিকে দীর্ঘ, দীর্ঘকাল ধরে ন্যূনতম মানবাধিকার থেকে বঞ্চিত করে রাখা হয়েছে। লোধা ও খেড়িয়াদের অস্তিত্ব বড়োই বিপদসঙ্কুল কারণ গ্রাম ও শহরের প্রভাবশীল লোকেরা এদের মধ্যে একাংশকে চুরি ও ডাকাতির কাজে লাগায়। মারা পড়ার সময় লোধাদের নিয়ে খবর হয় এবং অচিরেই তা লোকে ভুলে যায়। পুলিশ ও বনবিভাগের কর্মীরা এত লোধাকে প্রাণে মারল, এত খেড়িয়ার ওপর নির্যাতন চালাল কিন্তু চোরাই মাল যাদের কাছে যায় সেই ধনী ও ক্ষমতাশালী শয়তানদের কেশাগ্রও কেউ স্পর্শ করল না।[২]

...তা দেবীর এই উপলব্ধি ও পর্যবেক্ষণের বাস্তবতা মিলে যায় ভগীরথ মিশ্রের সঙ্গে। ...লের প্রতি উক্ত মানসিকতা ও শোষণের সাহিত্যিক নির্মাণ ঘটালেন ভগীরথ মিশ্র তাঁর ...উপন্যাসে। ১৯৯২ সালে প্রকাশিত ভগীরথ মিশ্রের 'তস্কর' উপন্যাসের শুরু বাণেশ্বর ...বাড়িতে গোক্ষুরের আগমনে, শেষও বাণেশ্বর রায়ের বাড়িতে গোক্ষুরের আগমন ...ঘোষণায়। মাঝের পরিসরে গোক্ষুর ভক্তার দক্ষ চোর থেকে চোর বানিয়ে রাখার

Dilip Rout

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Structural studies of immunomodulatory (1 → 3)-, (1 → 4)-α glucan from an edible mushroom *Polyporus grammocephalus*

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ABSTRACT

A water soluble polysaccharide (PGPS) with molecular weight ~ 1.4×10^5 Da was isolated by alkali treatment from an edible mushroom *Polyporus grammocephalus* and purified by gel chromatography using sepharose-6B column. Monosaccharide analysis revealed that PGPS was made up of glucose only. PGPS contained (1 → 3)-α-D-Glc*p* and (1 → 4)-α-D-Glc*p* moieties in a molar ratio of nearly 1:2. Through a series of chemical and spectroscopic (1D/2D NMR) investigations, the repeating unit of the glucan was established as:
→3)-α-D-Glc*p*(1 → [4)-α-D-Glc*p*(1]$_2$→
This α-glucan was observed to stimulate some prime components of immune system, namely, macrophages, splenocytes, and thymocytes.

1. Introduction

Mushrooms are attractive functional food and also considered as an important renewable source for the development of immune-active drugs [1]. Mushroom polysaccharides, especially glucans have become a prime theme of research for immunobiologists due to their immunomodulatory and antitumor properties [2–7]. Numerous bioactive β-D-glucans with diversified structural features have been isolated from edible mushrooms [8–10]. Apart from the β-D-glucans, various linear and branched α-D-glucans have also been reported. Linear (1 → 3)-α-D-glucan from *Armillariella tabescens* [11] and *Termitomyces microcarpus* [12], (1 → 6)-α-D-glucan from *Termitomyces eurhizus* [13] and *Pleurotus florida* [14], (1 → 3)-, (1 → 6)-α-D-glucan from *Termitomyces eurhizus* [13], (1 → 4)-, (1 → 6)-α-D-glucan from *Agaricus blazei* [2,15] and *Tricholoma matsutake* [16] have been reported to show their immunomodulating and antitumor activities. A branched α-D-glucan having α-(1 → 4)-D-glucopyranosyl main backbone chain with (1 → 6)-α-D-glucopyranosyl side chain has been identified from the fruiting bodies of *Coprinus comatus* [17]. Moreover, linear glucans containing both α- and β-glycosidic linkages such as α-(1 → 4), β-(1 → 6)-D-glucan from *Astraeus hygrometricus* [18] and α-(1 → 4), β-(1 → 3)-D-glucan from *Termitomyces microcarpus* [19] have also been reported.

Polyporus grammocephalus is an edible mushroom commonly found in the hill areas of West Bengal, India. It generally occurs on dead hard wood causing white rot and occasionally growing as a parasite on living trees. *Polyporus grammocephalus* contains 20.6% of protein, 41.11% of carbohydrate, 24.62% of crude fibre, 8.75% of free amino acids, 2.03% of fat and sufficient amount of important minerals such as calcium, potassium and phosphorous, *etc.* [20]. As claimed by a published report, *P. grammocephalus* contains essential oils, phenols, terpenes, steroids, fatty acids, sugars, anthraquinones, coumarins, anthrones, tannins, flavonoids, and alkaloids [21]. So, it can be considered as an excellent and safe dietary component. *P. grammocephalus* is also known to show significant antioxidant, antimicrobial and NOS activation properties [22,23]. Different solvent extracts of *P. grammocephalus* showed cytotoxic and chemo protective effects [21,24]. Bioactive components isolated from certain polyporus species like *P. confluence*, *P. umbellatus*, *P. sulphureus*, *P. badius*, *and P. sclerotium* have been reported to exhibit antitumor, immune-enhancing, antibacterial, anti-inflammatory, antiviral, anti-aldosteronic & diuretic effects [25–29]. The present article deals with an immunoenhancing (1 → 3)-, (1 → 4)-α-glucan which was isolated from the alkaline extract of the fruit bodies of *Polyporus*

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The synthesis, biological evaluation and fluorescence study of chromeno[4,3-*b*]pyridin/quinolin-one derivatives, the backbone of natural product polyneomarline C scaffolds: a brief review

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Coumarins (natural, as well as synthetic) are an important class of heterocycles having immense potential for industrial and medicinal applications. Coumarin-fused heterocycles, mainly pyridine or quinoline, possess a plethora of biological attributes such as anti-bacterial, anti-fungal, and anti-cancer properties, in addition to being fluorescence active. This review aims to assess the past and current status of research works associated with these compounds in light of the vast body of work on different synthetic methodologies, bioactivity and fluorescence studies by looking specifically at chromeno[4,3-*b*]pyridin/quinolin-one derivatives, the backbone of natural product polyneomarline C scaffolds, during the past two to three decades. The synthesis of chromeno[4,3-*b*]pyridin/quinolin-one derivatives by the construction of either pyridine, or quinoline, or coumarin rings *via* classical reaction protocols, ultrasound-mediated reactions, microwave-mediated reactions, organo-catalyzed reactions, transition metal-catalyzed reactions, metal-free ionic liquid-mediated reactions and green reaction protocols starting from suitable precursors has been reported in the literature. This review also aims to be a prospective resource for the uninitiated work towards the development of new synthetic strategies, exploring the newer domains of biological and the fluorescence activity studies of chromeno[4,3-*b*]pyridin/quinolin-one derivatives.

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Gandhi Kumar Kar

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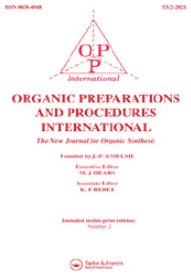

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Solvent- and Catalyst-Free Synthesis of 6*H*-Chromeno [4,3-*b*]quinolin-6-ones

Prasanta Patra

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Diverse synthesis of pyrrolo/indolo [3,2-*c*]coumarins as isolamellarin-A scaffolds: a brief update

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This paper reviews a vast body of literature on diverse synthetic methodologies, biological, and fluorescence activities of pyrrolo/indolo[3,2-*c*]coumarin derivatives published during last 20 years. Synthesized pyrrolo/indolo[3,2-*c*]coumarins have been reported in the literature by the construction of either pyrrole, indole, or coumarin ring *via* classical reaction protocols including metal-catalyzed reactions, and green reaction protocols starting from suitable precursors.

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Introduction

The chemistry of coumarin derivatives (natural, as well as synthetic) has occupied a significant position in the field of synthetic and medicinal chemistry due to various biological activities[1–6] that include anti-microbial,[7–9] anti-depressant,[10] anti-oxidant,[11–13] anti-leishmanial,[14] anti-inflammatory,[15] anti-coagulant,[16] and anti-cancer[17] reported over the last 50–60 years. On the other hand, pyrrole and indole derivatives are also important for their robust biological interests.[18–20]

Khokan Samanta

Dr Khokan Samanta was born in the village of Purba Medinipur, West Bengal, India. He did his MSc (2006) from Vidyasagar University, Paschim Medinipur, and PhD (2012) in Synthetic Organic Chemistry under the joint supervision of Prof. Achintya Kumar Sarkar and Prof. Gandhi Kumar Kar at Presidency University (formerly Presidency College under University of Calcutta), Kolkata, India. He carried out his postdoctoral research (2012–2013) in nanotechnology under Prof. Hyoyoung Lee at Sungkyunkwan University, South Korea. He is working as an Assistant Professor (WBES) since 2015 at the Department of Chemistry, Haldia Government College, West Bengal, India. His research interest is based on the metal-catalyzed C–C coupling reaction, synthesis of bio-active heterocycles, and graphene-nanochemistry.

Prasanta Patra

Dr Prasanta Patra was born in the village of Paschim Medinipur, West Bengal, India. He did his MSc (2006) from Vidyasagar University, Paschim Medinipur, and PhD (2012) in Organic Chemistry under the supervision of Prof. Gandhi Kumar Kar at Presidency University (formerly Presidency College under Kolkata University), Kolkata, India. He is an Assistant Professor of the Department of Chemistry, West Bengal Education Service, since 2009. He is currently working as an Assistant Professor of Chemistry at the Department of Chemistry, Jhargram Raj College. His research interest is on the improvement of methodologies of heterocycles mainly γ-lactams and pyrido-coumarins and their biological importance.

Subhasree Pradhan

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Communication

Hidden Fermi liquidity and topological criticality in the finite temperature Kitaev model

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A. Quantum spin liquids
B. Strongly correlated systems
C. Superconductivity
D. Mott Insulator Transition

ABSTRACT

The fate of exotic spin liquid states with fractionalized excitations at finite temperature (T) is of great interest, since signatures of fractionalization manifest in finite-temperature (T) dynamics in real systems, above the tiny magnetic ordering scales. Here, we study a Jordan–Wigner (JW) fermionized Kitaev spin liquid at finite T employing combined exact diagonalization and Monte Carlo simulation methods. We uncover (*i*) checkerboard or stripy-ordered flux crystals depending on density of flux, and (*ii*) establish, surprisingly, that: (*a*) the finite-T version of the $T = 0$ transition from a gapless to gapped phases in the Kitaev model is a Mott transition of the fermions, belonging to the two-dimensional Ising universality class. These transitions correspond to a topological transition between a string condensate and a dilute closed string state (*b*) the Mott "insulator" phase is a precise realization of Laughlin's gossamer (here, p-wave) superconductor (g-SC), and (*c*) the Kitaev Toric Code phase (TC) is adiabatically connected to the g-SC, and is a *fully* Gutzwiller-projected fermi sea of JW fermions. These findings establish the finite-T quantum spin liquid phases in the $d = 2$ to be *hidden* Fermi liquid(s) of neutral fermions.

1. Introduction

The exactly solvable Kitaev model (KM) [1] exhibiting quantum spin liquid (QSL) [2] behavior with fractionalized excitations has led to a spurt of activity in various contexts [3–6]. Whilst studied numerically [7], a physically satisfying picture of finite-temperature responses in terms of changes in the underlying spectrum of elementary excitations of the QSL state remains elusive. In a QSL, the fractionalized excitations are expected to manifest as a broad continuum of spin excitations in various scattering experiments [8] (inelastic neutron, two-magnon Raman, resonant inelastic X-ray probes). A complication is that small residual (e.g, Heisenberg) couplings frustrate such a quest at very low T in real systems, and thus extension of ground state investigations to T larger than the small ordering scales, where the novel spin excitations should reveal themselves, is crucial toward establishing spin liquidity in practice.

The KM is attractive because of its exact solvability at $T = 0$ in $d = 2, 3$. The fermionized Kitaev model can be transformed to a p-wave superconductor (SC), and hence is exactly solvable at $T = 0$ (because of the flux-free condition), but this does not hold at finite T. Specifically, finite but not-too low T excites finite density of "fluxes": in a Jordan–Wigner (JW) fermionization, the KM maps on to the spinless Falicov–Kimball model (FKM) with a finite p-wave BCS term for the JW fermions [9]. The Z_2 flux variables are, remarkably, recast as immobile spinless fermions. This Falicov–Kimball-like model has no exact solution in $d = 2, 3$ at finite T, so finite T investigations have received much less attention in literature. To date, Yoshitake et al. [10] and Nasu et al. [11] have used cluster-dynamical mean-field theory (CDMFT) and a different version of Monte-Carlo plus exact diagonalization (MC+ED) studies to investigate the effect of fluctuating fractionalized spins on finite-T magnetic fluctuation responses. The FK-like interaction between the mobile and immobile Majorana fermions

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Prasanta Patra

Issue 32, 2021

Previous Next

From the journal:
New Journal of Chemistry

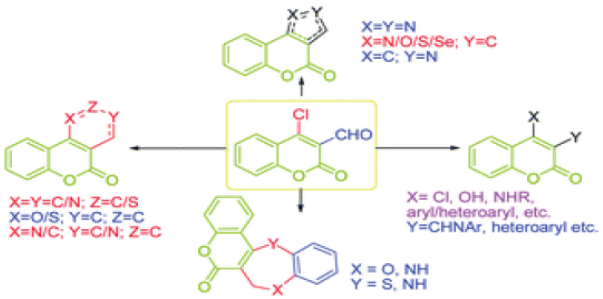
4-Chloro-3-formylcoumarin as a multifaceted building block for the development of various bio-active substituted and fused coumarin heterocycles: a brief review

Prasanta Patra [a]

Author affiliations

Abstract

This paper reviews the research data available in the literature on the chemistry of 4-chloro-3-formylcoumarins reported over the last two to three decades. It covers the synthetic applicability of 4-chloro-3-formylcoumarins in the development of 3,4-substituted coumarins as well as 5-, 6- and 7-membered ring fused coumarin derivatives *via* classical reaction protocols, microwave-mediated reactions, organo-catalyzed reactions, transition metal-catalyzed reactions, and green reaction protocols.



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From the journal:
New Journal of Chemistry

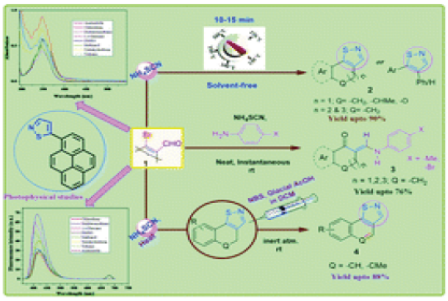
Neat synthesis of isothiazole compounds, and studies on their synthetic applications and photophysical properties †

Anirban Bera [ab], Prasanta Patra [c], Abulkalam Azad [a], Sk Asraf Ali [a], Susanta Kumar Manna [a], Amit Saha [*b] and Shubhankar Samanta [*a]

Author affiliations

Abstract

Ammonium thiocyanate-promoted simple, rapid and eco-friendly neat synthesis of isothiazoles is developed for the first time. It is noteworthy that an instantaneous valuable synthetic route of β-enaminones is also documented during the mechanistic investigation of isothiazole formation. A detailed mechanistic explanation of the isothiazole formation reaction is clearly explained by the control experiments. NBS-promoted aromatisation of isothiazole derivatives and photophysical properties of an isothiazole-pyrene hybrid molecule have been investigated.



Sikandar Ansari

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The role of Constructivism Theory in International Politics and its impact on India-Bangladesh land boundary agreements (LBA)

Sikandar Ansari

The Basic concept of International Politics

A distinction between the two terms, international relations and international politics, come to be made increasingly in the post Second World War period. Hans Morgenthau the great realist thinker believed that the core of international relations lies in study of the continuous processes by which states adjust their national interests to accommodate those of other states.[1] Power is the means through which nations uphold their national interest; therefore international politics is a struggle for power. IR covers wider ground, inclusive of varied relationship between sovereign states. The study of international politics is narrower in scope, dealing with conflict and cooperation among nations, essentially the political level. The nature of IR underwent remarkable changes in the post second world war period. Traditionally, the universe of IR had been Eurocentric with interstate relations being conducted by diplomats with a great deal of secrecy. Diplomatic conferences, or even their outcomes, were not treated as familiarity for the public domain. Since the post second world war period, there has been democratization for the foreign policy making processes, with public opinion playing an escalating role of governmental decision making with the revolution in modern communications , pass through and connectivity.

The nature of diplomacy has also changed. Today, heads of state and marginalising the role of diplomats and ambassadors to a great coverage. In international relations, constructivism is a theory that emphasized the human ideas, concepts, thoughts and belief. The early constructivism belief that our history and social world were created by human ideas and conceptions contemporary constructivism revived these arguments after the cold war and holds the view that society. The world and human relations are not just natural or physical; they shaped by human thoughts, ideas and beliefs. After the Second World War (1945) the existence of two opposing power alliances led by the USA (United States of America) and USSR (Union of Soviet Socialist Republics) were noticed throughout the world. The existence of these two opposing power alliances creates an atmosphere of antagonism. This situation is known as cold war. The cold war is variously known as war of nerves, proxy war and conflict of ideology in east and west.

Constructivism is a social theory that is broadly concerned with the relationship between agents and structure. It is not a substantive theory .A substantive theory is considered transferable, rather than generalizable in the sense that elements of the context can be transferred to contexts of action with similar characteristics to the context under study. Substantive theory offers specific claims and hypotheses about patterns in world politics; for instance, how do we explain why democratic states tend not to wage war on one another? In this way constructivism is best compared with another choice. Rational choice is social theory that offers a framework for understanding how actors operate with fixed preferences that they attempt to maximize under a set of constructivism.

2.1.1. Basic features of constructivism:

(a) All human relations including international relations are made though conscious human efforts, because international politics and economics are not governed by natural laws; these are controlled by manmade laws;

(b) Every material manifestation in international relations bears meaning given to it by human ideas;

(c) Human relations including international relations depend on inter-subjective beliefs which shape different kind of human relations;

(d) Co-operation or conflicts in international relations are not due to material, considerations; these are reflected through Arguments or disagreements of human minds.

[1] Rumki Basu, International politics ,concept ,theories and issues (Sage publications India pvt ltd, 2012) p.xxvi

Subhasree Pradhan

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Fractionalized Kitaev model in a low magnetic field along [1 1 1]

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ABSTRACT

Kitaev model in the presence of the magnetic field along the [1 1 1]-direction hosts topological excitations; the field dependence of the Kitaev model is specifically revisited in terms of fractionalized excitations. The weak-field limit is examined in terms of fractionalized spinon excitations employing Hartree-Fock BdG mean-field theory on a fermionized Kitaev model. We show that the original model of spins on a honeycomb lattice can be mapped on to a model of BCS superconductor constituting different kinds of pairing with a local constraint embodied in the model. It is also shown that the ground state Kitaev model has pairing on certain bonds forming a topological quantum order such as dimer model of valence bond solid in the low-field side. This order vanishes with the increasing magnetic field and at a critical field pairing vanishes, hence driving the system to a gapped phase.

Selection and peer-review under responsibility of the scientific committee of the Condensed Matter Physics.

1. Introduction

The description of the Quantum spin liquids (QSL) [1,2] goes beyond the traditional Landau theory of symmetry-breaking, the concept of topology plays a central role in the current foreground of condensed matter physics. Spin liquids exhibit various characteristic topological properties which manifest themselves in fractional spin excitations and a topologically protected ground-state degeneracy. Among QSLs, a subclass often referred to as Kitaev QSLs [3], has recently attracted much attention, both theoretically and experimentally. Indeed, the Kitaev honeycomb model is arguably the paradigmatic example of QSLs because of its unique combination of being experimentally relevant, exactly solvable, and hosting a variety of different interesting gapped and gapless QSL phases [4–6]. In addition, if the materials are close enough to the QSL regime, one may hope to find remnants of QSL behavior or related features from spin fractionalization. A principle example for such a fractionalization is the spinon excitations of a resonating valence bond (RVB) liquid, which carry spin-1/2 and arise only after breaking apart a spin-1 excitation originating from an elementary spin-flip process.

The Kitaev model defined as, $H = \sum_{\nu(\nu=x,y,z)} K^{\nu} \sum_{ij} S_i^{\nu} S_j^{\nu}$,where S_i^{ν} is the ν projection of spin-1/2 degrees of freedom on each site, $\nu = x,y,z$ is the nearest neighbour bond index of each site. We consider the interaction parameter K^{ν} to be antiferromagnetic ($K^{\nu} > 0$, $K = 1$ eV) and isotropic for all the three bonds. The special feature of the model is that the spin components are coupled by an exchange interaction which depends on the bond direction. This model turns out to be exactly solvable upon the introduction of fractionalized quasi-particles. This model exhibits a spin liquid phase, known as Kitaev spin liquid (KSL). Upon the action of a magnetic field, time-reversal symmetry is broken and the exact solvability of the model is lost. There are studies wherein a variety of numerical techniques have been used to probe different exotic phases as obtained under the application of the Zeeman field [7–9], the previously degenerate spin-up and spin-down bands are now split by an energy separation set by the Zeeman term.

In the presence of a weak magnetic field, such as the Zeeman coupling would only have a perturbative effect on the QSL ground state and the spinon remains to be a valid description of the magnetic excitation. Excitations of conventional phases have integer spin, so spinons are fractional quasiparticles.

Therefore, the Kitaev spin model can be mapped on to a model of fermions in terms of fractionalized spinons whose ground states are characterized by several local order parameters. We introduce the following representation of the spin-$\frac{1}{2}$ operator in terms of fermions: $S_i^{\nu} = \sum_{\alpha,\beta} \frac{1}{2} \left(c_{i\alpha}^{\dagger} \sigma_{\alpha\beta} c_{i\beta} \right)$ where $\sigma_{\alpha\beta}$ is the Pauli spin matrix.

This representation doubles the dimension of the local Hilbert space on each site where the physical spin-$\frac{1}{2}$ states are those that

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MINI REVIEW ON PYRIDO[2,3-*c*]COUMARINS BACKBONE OF SANTIAGONAMINE ANTIBIOTICS

Prasanta Patra[a]* and Susanta Patra[b]

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Abstract - Santiagonamine is a natural coumarin fused pyridine, specifically pyrido[2,3-*c*]coumarin derivative having wound-healing activities and is extracted from stems and branches of the South American shrub *Berberis darwinii* Hook. It was isolated by Shamma *et al*. in 1984. Both coumarin and pyridine represent an important class of a multi tasking and multi functional scaffolds in organic synthesis. So, the syntheses of coumarin fused pyridine derivatives have an immense impact in the field of organic and pharmaceutical chemistry due to various biological activities displayed by such classes of compounds as well as for their natural occurrences. The main purpose of this review is to focus on different synthetic methodologies for the synthesis of specifically pyrido[2,3-*c*]coumarins as it is the backbone of santiagonamine antibiotics. Several methods for the synthesis of pyrido[2,3-*c*]coumarins have been described in the literature, most of which use 3-aminocoumarin as the starting material.

CONTENTS

Prasanta Patra

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SYNTHETIC COMMUNICATIONS REVIEWS

A short review on the synthesis of pyrrolo[3,4-*c*]coumarins an isolamellarin-B scaffolds

Prasanta Patra

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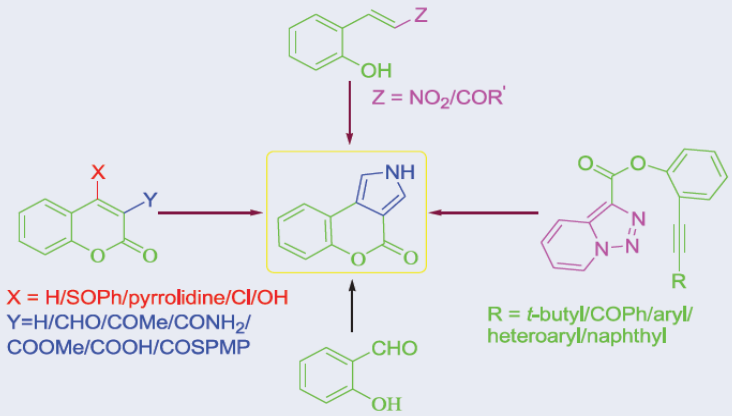
ABSTRACT

This review presents a vast body of literature on various synthetic methodology, biological, and fluorescence activities of pyrrolo[3,4-*c*]coumarins as published during the last 20–30 years. Synthesized pyrrolo[3,4-*c*]coumarins have been reported in the literature by the construction of either pyrrole, indole, or both rings *via* different synthetic methodology including metal-catalyzed reactions, and green reaction protocols starting from readily accessible substrates.

GRAPHICAL ABSTRACT



This review presents the different synthetic approach of pyrrolo[3,4-*c*]coumarins an isolamellarin-B *via* classical, metal-catalyzed and green reaction protocols starting from suitable precursors.

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KEYWORDS
1,3-dipolar-cycloaddition; condensation-cyclization; isolamellarin-B; lamellarin; pyrrolo[3,4-*c*]coumarins

Introduction

Coumarin nucleus is found to be present in many natural products, pharmaceuticals, and organic materials.[1] So, derivatives of coumarin have occupied a significant position in the field of synthetic and medicinal chemistry. These derivatives display numerous biological activities,[2–16] some of which have been reported in the literature as long

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Exploring axions through the photon ring of a spherically symmetric black hole

Sourov Roy,[a,1] **Pratick Sarkar,**[a] **Subhadip Sau**[b,c] **and Soumitra SenGupta**[a]

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Abstract. In this study, we examine the phenomenon of photon axion conversion occurring in the spacetime surrounding a black hole. Specifically, we focus on the potential existence of a magnetic field around the supermassive black hole M87*, which could facilitate the conversion of photons into axions in close proximity to the photon sphere. While photons traverse through the curved spacetime, they spend time near the photon sphere, where conversion of these photons into axions takes place. Consequently, this process leads to a decrease in the intensity of the black hole's photon ring. To explore the possibilities of detecting these hypothetical axion particles, we propose observing the photon sphere using higher resolution telescopes. By doing so, we can gain valuable insights into the conversion mechanism as well as the nature of the spherically symmetric black hole geometry. Moreover, we also investigate how the photon ring luminosities are affected if the black hole possesses a charge parameter. For instance apart from U(1) electric charge, the presence of extra dimension may induce a *tidal charge* with a characteristic signature. It is important to note that the success of the conversion mechanism relies on the axion-photon coupling and mass. As a result, the modified luminosity of the black hole's photon ring offers a valuable means of constraining the axion's mass and coupling parameter within a certain range. Thus our findings contribute to a better understanding of photon axion conversion in the environment of a black hole spacetime and helps us explore the possible existence of extra spatial dimension.

Keywords: axions, extra dimensions, gravity, modified gravity

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Sanjib Kumar Das and Koushik Sen

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Biodiversity of Avifauna in Chilkigarh, Jhargram, West Bengal (India)

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ABSTRACT

Chilkigarh is a rural and tribal area in the jangal-mahal belt of West Bengal situated at the bank of Dulung river in Jamboni block, district Jhargram, 14 km away from the main town of Jhargram. The present study deals with the documentation of avifaunal diversity in this region. The study was carried out from December 2021 to July 2022. The study area includes Chilkigarh Raj Palace, Dulung river bank, Chilkigarh Kanak Durga Sacred Grove, Chilkigarh hospital area, Sonajhuri garden, Sal Forest, Open grasslands, Agricultural lands, etc. A total of 37 birds belonging to 24 families under 10 orders were photographed and identified at the species level. 19 out of these 37 species are legally protected under Wildlife (Protection) Act, 1972. The most dominant species-rich order was Passeriformes (54%). Based on feeding habits they have been grouped and Omnivore becomes the dominant (37.8%) one. This study provides important data-based documentation for future investigation and conservation strategy planning in this particular area.

Keywords: *Avifaunal diversity, Feeding habits, GPT, Chilkigarh birds, Jhargram, West bengal*

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INTRODUCTION

An ecosystem is a structural and functional unit of ecology, consisting of both organisms and the physical environment with which they interact (Chapin *et al.*, 2011). Faunal components of the ecosystem play a crucial role in the maintenance and sustainability of the ecosystem; Feathered bipeds are paying to the ecosystem through various services like pest control, scavenging, pollination, seed dispersal, etc. (Priya *et al.*, 2022). Chilkigarh is a rural and tribal area on the bank of the Dulung river. Chilkigarh Kanak Durga Sacred Grove is one of the famous tourist destinations for its distinct habitat patches and floral and faunal components. 388 species of higher plants and 26 species of megafauna including 13 species of birds have been previously reported (Bhakat, 2015). In 2018 the site has been declared as Chilkigarh Kanak Durga Biodiversity Heritage Site by Environment Department, Govt. of West Bengal, India. Chilkigrah Raj Palace, Sonajhuri garden, and Sal Forest areas are other important places to visit. As the avifaunal diversity of the entire chilkigarh area has not been worked out previously, this study is an effort to document avian diversity along with their feeding habits, enumeration of their local status, and its comparison with global population trend (GPT) which will provide a guideline for future large-scale study and planning of conservation strategies.

MATERIALS AND METHODS

Study area

Chilkigarh **(Figure 1)** is located between latitudes 22º 27′ 20″ N to 22º 56′ 50″ N and longitude 86º 52′ 20″ E to 86º 53′ 10″ E; the average elevation is 60–85 m of the mean sea level (Saadi *et al.*, 2020). It is situated around 14 km away from Jhargram town, West Bengal. This area is located at the bank of the Dulung river and consists of mixed vegetation of deciduous, semi-deciduous, and evergreen trees (Bhakat, 2015). Due to various kinds of habitats, this area contains huge vegetation of Sal Forest which is commonly under the 'Tropical Moist Deciduous Forest' type, and various kinds of shrubs, herbs, climbers, and grasses which provides a good source of food and habitat for several animals. Several different areas like Dulung river bank, Chilkigarh Kanak Durga Sacred Grove, Open grassland, Chilkigarh hospital area, Chilkigarh Raj Palace, Sonajhuri garden, Sal forests, and Agricultural lands were the primary sites of this study.

Prasanta Patra and Debnarayan Roy

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REVIEW ARTICLE

A Brief Review on the Synthesis of Pyrrolo[2,3-*c*]coumarins, including Lamellarin and Ningalin Scaffolds

Prasanta Patra[a], Sibasish Manna[a], Susanta Patra[b], Khokan Samanta[c], and Debnarayan Roy[d]

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REVIEW ARTICLE

4-Aminocoumarin Derivatives as Multifaceted Building Blocks for the Development of Various Bioactive Fused Coumarin Heterocycles: A Brief Review

Prasanta Patra[1,*] and Susanta Patra[2]

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Abstract: Aminocoumarins are found to be present in many natural products, pharmaceuticals, and organic materials. These derivatives demonstrate numerous biological activities including DNA gyrase, anti-proliferative and anti-breast cancer activities. Among the all-aminocoumarin derivatives, 4-aminocoumarin derivatives have been reported to exhibit anti-cancer and anti-fungal properties. 4-Aminocoumarins and their derivatives are important precursors for the synthesis of coumarin fused *N*-heterocycles. Due to the presence of an amino group as well as enamine carbon, it is very reactive towards electrophiles and in most of the cases, it has a higher tendency to cyclize immediately by the various reaction path ways and provides the heterocyclic products. Unlike other aromatic amines, it did not give any Schiff base on reaction with aldehydes or ketones. Lamellarins, ningalin A, ningalin B, schumanniophytin, santiagonamine, goniothaline, and polyneomarline C are important natural coumarin fused *N*-heterocycles and show excellent biological activities, including antitumor, reversal of multidrug resistance, anti-HIV, wound healing, anti-malarial, anti-hepatitis, and anti-syphilis activities. The synthesized coumarin fused *N*-heterocycles have been reported to display *Topoisomerases* I inhibitory, DYRK1A inhibitory, and anti-cancer activities. Most of the syntheses of pyrrolo/imidazolo/indolo[3,2-c]coumarin, pyrido/quinolino[3,2-c]coumarins, pyrimidino[*c*]coumarin and oxazino[*c*]coumarin have been synthesized easily from 4-aminocoumarin. This paper reviews the research data in the literature on the synthesis of bioactive coumarin fused heterocycles using 4-aminocoumarin derivatives over the period of 2-3 decades. It covers the synthetic applicability of 4-aminocoumarin for the development of coumarin fused 5-, 6-, and 8-membered ring derivatives *via* classical reaction protocols, microwave-mediated reactions, organo-catalyzed reactions, transition metal-catalyzed reactions, and green reaction protocols.

Keywords: 4-Aminocoumarin, coumarin-fused-heterocycles, condensation-cyclization, C-N coupling, C-C coupling, bioactivity.

1. INTRODUCTION

Coumarin fragments are significant oxygen-containing heterocycles found in nature as well as in synthesized molecules. They have been extensively used in pharmaceuticals, agrochemicals, and materials science over the last 150-200 years [1-7]. Umbelliferone [8] (sunscreen agent), warfarin [9] (anti-coagulant agent) and dicoumaro [10] (anti-coagulant agent) are well-known for their widespread natural occurrence as well as their remarkable biological properties. Aminocoumarin derivatives [11-13], are the core structure of many natural products. They are found to act as an inhibitor of DNA gyrase [14, 15], heat shock protein 90 antagonists [16], and antiproliferative, and anti-breast cancer activities [17]. Among the all-aminocoumarin derivatives, 4-aminocoumarins and their derivatives have been reported to exhibit anti-cancer [18] and anti-fungal [19] activities. While coming across the literature, we found a gradual increase in the studies towards the synthesis of 4-aminocoumarin derivatives and their application to synthesize bioactive coumarin fused heterocycles. Recently, Sadeghpour *et al.* [20] have documented the literature on the synthesis of 4-aminocoumarin and their derivatives only, but there was no report on the application of 4-aminocoumarins. To promote the investigation of 4-aminocoumarins as building blocks for the construction of various bioactive five-, six-, or eight-membered ring-fused coumarin heterocycles, this review will first offer a brief overview of the applications of 4-aminocoumarins in cyclization reaction.

2. PREPARATION OF 4-AMINOCOUMARIN

Sadeghpour *et al.* [20] have highlighted in depth numerous synthetic methods for the preparation of 4-aminocoumarin and their derivatives in their review. In most cases, the syntheses of title compounds have been achieved from either 4-hydroxycoumarin or 4-chlorocoumarin under different reaction conditions to improve the yield and purity of the products.

3. CHARACTERISTICS AND REACTIVITY OF 4-AMINOCOUMARIN

4-Aminocoumarin [21, 22] is a pale-yellow solid. Several melting points were found in the literature, 226-228°C, 232-234°C, 241-243°C. In IR (KBr) spectra, the compound shows absorption maxima at 1634 cm^{-1}, characteristic of lactone carbonyl and which is significantly lower than the value of 1729 cm^{-1} (characteristics of lactone carbonyl of unsubstituted coumarin) due to the occurrence of strong conjugation between the -C=O and -NH_2 groups. The

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A short review on the synthesis of oxazolo/thiazolo/imidazolocoumarins and their biological activities

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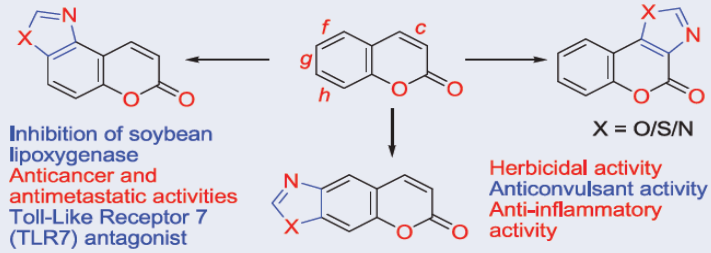
ABSTRACT

The coumarins are found in both natural and synthetic compounds that display a broad spectrum of biological properties including anticoagulant, antibacterial, antioxidant, and antiviral as well as anticancer properties. On the other hand, oxazole, thiazole, and imidazole are also important for their antimicrobial, anticancer, antitubercular, anti-inflammatory, antidiabetic, antiobesity properties and act as topoisomerase inhibitors, microtubule polymerization inhibitors and cytochrome P450 enzymes inhibitors. It has been reported that the coumarin fused oxazole, thiazole, and imidazole derivatives were found to exhibit antibacterial, antioxidant, antitumor, anticonvulsant, anti-inflammatory, anticancer as well as antimetastatic activity. The main purpose of this review is to highlight different synthetic methodologies for the synthesis of oxazolo/thiazolo/imidazolocoumarins (either angular or linear) and their biological importances reported in the literature. Several methods for the synthesis of such fused compounds in which 3-nitro/aminocoumarin derivatives are mostly used as the starting material, have been described in the literature.

GRAPHICAL ABSTRACT



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This review presents the synthesis and biological properties of oxazolocoumarins, thiazolocoumarins, and imidazolocoumarins *via* classical reactions as well as transition-metal catalysis.