COGNITION

Quarterly Research Newsletter of NIT Raipur

VOLUME 2, ISSUE 2, JULY 2022

NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
G. E. Road, Raipur 492010

CONTENTS

EDITORIAL NOTE: COGNITION
(Volume 2, Issue 2)

Dear Readers and contributors of Cognition,

Welcome to the Volume 2, Issue 2 of Cognition!

As our quarterly newsletter heads into its second successive year, we are happy to bring to you information on the efforts made by National Institute of Technology (NIT) Raipur in latest research and related activities. During the second quarter of the year i.e., April 2022 – June 2022, the Institute has made remarkable progress in research.

Issue 2 (Volume 2), highlights these important contributions made by our dedicated academics,researchers and students in their field-specific as well as interdisciplinary research.The Institute's strong research-culture, under the able guidance of Dr. A.M. Rawani, Director NIT Raipur, has been the major factor behind these accomplishments.This Issue will give you valuable insight into various research articles and chapters that have been published by the NIT fraternity in various high impact factor journals and with reputed publishers.

The Issue also specifies various research projects that have been approved or sanctioned in this quarter. It will also spotlight other research-oriented activities such as awarding of patents; signing of MoUs; organizing conferences, seminars, STTPs etc., initiating start-ups, promoting innovation etc.

EDITORIAL NOTE: COGNITION
(Volume 2, Issue 2)

We are hopeful that these glimpses into the immense efforts in research made by the NIT fraternity will be a source of pertinent information for you.

We are grateful to Dr. A.M. Rawani, Director NIT Raipur, for his extraordinary and consistent efforts in guiding and inspiring us towards achieving academic success and relevant research outputs.We are also grateful to our respected Deans, Heads of all the departments, faculty, researchers, scholars, administrative and non-teaching staff for all their support.

We would appreciate if you let us know your queries, inputs or concerns. We can be contacted at: cognition@nitrr.ac.in.

Team Cognition once again wishes you a great year ahead!
Warm regards!

Editorial Team
Cognition

HEAD

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Department of Physics

MEMBER

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Department of HSS

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Dr.Deepak Singh
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Department of CSE

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5th Semester
Department of BME

Jaykumar Kosare
5th Semester
Department of CSE

MOU DETAILS

Name of organization: National Institute of Hydrology, Roorkee

Date of MOU: May 06, 2022

Purpose of MOU: To promote academic and research cooperation through collaborative research activities, joint events, training of students and exchange of faculty, scientific & technical information.

About NIH Roorkee:
NIH Roorkee is a premier Research and Development organization under the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India. The main objectives of NIH are to undertake,aid, promote and coordinate systematic and scientific work in all aspects of hydrology. NIH Roorkee is the leading research organization in the field of water resources.More information available at: http://nihroorkee.gov.in/

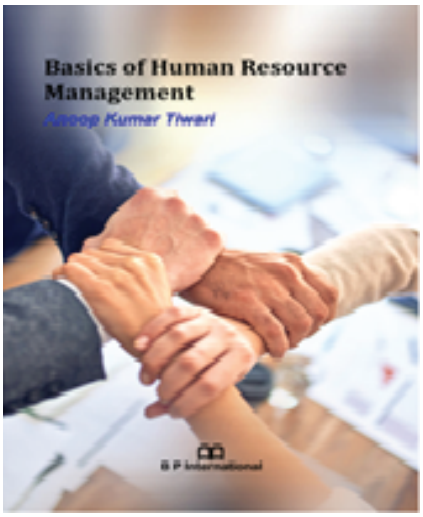
About The MoU:
The MoU was signed by Honorable Director NIT Raipur,Dr. A.M. Rawani, and Honorable Director NIH Roorkee,Dr. J. V. Tyagi, on 6th May 2022. The MoU will be active for a period of five years.

The key features of the MoU are:

1. Exchange of faculty in areas of mutual interest.
2. Exchange of scientific and technical information.
3. Formation of research groups.
4. Joint supervision of Postgraduate and Ph.D. students.
5. Undertaking collaborative research activities through participation in nationally and internationally funded projects.
6. Jointly organizing events such as seminars, workshops, conferences and training programmes.
7. Training of students at NIH as per the facilities and resources available.
8. Sharing of library facilities.

PUBLISHED BOOKS & BOOK CHAPTERS

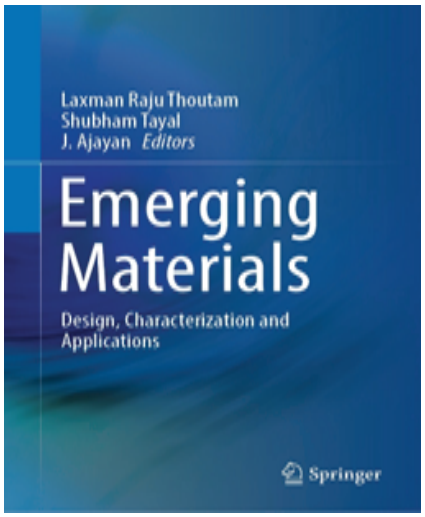
Title of the Book: Basics of Human Resource Management
Publisher: B P International ISBN 978-93-5547-556-5 (Print)
ISBN 978-93-5547-561-9 (eBook)
Month and Year of Publication: April, 2022
Author's Name(S): Anoop Kumar Tiwari



This book is an attempt to meet the needs of engineering graduates in understanding Human Resource Management before they leave the campus and to join the corporate world. The Young graduates while climbing up an organization ladder will have to deal partially with machine and largely with people. This book will have to be an advantage human resource management comprises the formal systems designedto manage people for the better performance of a company and with the inclusion of talent, skill and organizational culture. This book deals with three aspects : The strategy and planning of human resource management, strategic types of human resource and common pitfalls of building human resource strategies.

PUBLISHED BOOKS & BOOK CHAPTERS

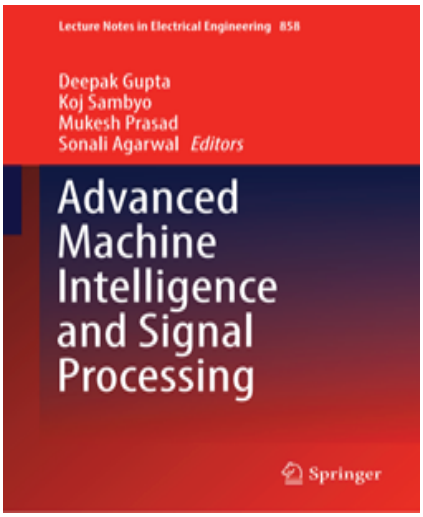
Title of the Book: Emerging Materials Design, Characteristics and Applications
Title of the Chapter: A brief on emerging materials and its photovoltaic application.
Publisher: Springer ISBN: 978-981-19-1311-2 (print),
ISBN: 978-981-19-1312-9 (online)
Month and Year of Publication: May, 2022
Author's Name(S): Deborah Muchahary, Sagar Bhattarai, Ajay Kumar Mahato and Santanu Maity



In this chapter, an overview of different novel materials used in solar cell is presented.The inside physics and most common materials used in a variety of solar cells are described. Material is the heart of a solar cell device and selection, and development of proper material are a crucial task for device development. Amongst different types, hybrid, perovskite and organic solar cells are cheap and provide comparable power conversion efficiency to the conventional silicon based solar cell. Superior element for a hybrid solar cell is PEDOT: PSS blend and Si heterojunction. Different additives to improve the efficiency in such solar cell are discussed. Moreover, different organo-metallic perovskite materials with ferroelectric characteristics are discussed in this chapter. The ferroelectricity uplifts the open circuit voltage of the solar cell beyond its energy band gap. The analytical description of device performance in such under different charge carrier transport materials are presented as well. Both organic and inorganic materials are suitable for electron and hole transporting layer.The perovskite materials are leading its way to lower dimensional versions which are suitable for both solar cell and other optoelectronic devices. The stability of lower dimensional perovskite leads to Dion-Jacobson (DJ) and Ruddlesden-Popper (RP) phases and are discussed in this chapter. Moreover, working physics and materials used in organic solar cell are also a part of this chapter.

PUBLISHED BOOKS & BOOK CHAPTERS

Title of the Book: Advanced Machine Intelligence and Signal Processing
Title of the Chapter: Processing/ Feature Extraction and Fusion of Multiple Convolutional Neural Networks for Firearm Detection
Publisher: Springer, Singapore 978-981-19-0839-2 , 978-981-19-0840-8 (eBook)
Month and Year of Publication: June, 2022
Author's Name(S): Anamika Dhillon and Gyanendra K Verma



This chapter presents a framework for classification and detection of handheld firearms (guns) which integrates deep fusion of feature information to generate the most discriminate feature vector. Firstly, we utilize the fully connected layers of recent deep CNN models: Inception-ResNetv2 and MobileNetv2 for feature extraction, and then we fuse these features by using concatenation operation. To acquire a more compact presentation of features and reduce the complexity of computation, we have utilized NCA. After that, we classify the images by using an SVM classifier. Finally, to detect the guns in an image, a bounding box regression module is proposed by applying LSTM. Qualitative and quantitative outcomes indicate that our framework can detect guns with huge variations in size along with rigorous occlusion.

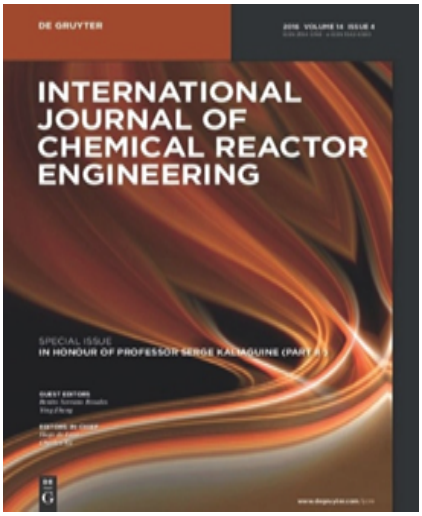
PUBLISHED BOOKS & BOOK CHAPTERS

Title of the Book: Environmental Informatics
Title of the Chapter: AI in Waste Management: The Savage of Environment
Publisher: Springer 978-981-19-2082-0
Month and Year of Publication: June, 2022
Author's Name(S): Sharda Bharti, Shourat Fatma and Vinay Kumar

To fasten the process and efficiently manage the waste collection, artificial intelligence(AI) may play a critical role in waste management which starts with the use of smart garbage bins. AI-based sensors can discriminate items composed of different materials and distinguish the items of the same material whether an item has been chemically contaminated, ensuring purity of the waste stream. The advantage of using such smart bins have effectively optimized the routes, timing and frequencies of waste collection, and reducing the load of municipalities. Such automated process would provide the best use of technology for effective waste management to prevent the human health risks as well as to protect the environment. This review article includes details on various techniques based on machine learning and the use of artificial intelligence for efficient waste management than could significantly minimize the risks associated with human health and environment.

PUBLISHED BOOKS & BOOK CHAPTERS

Title of the Book: International Journal of Chemical Reactor Engineering
Title of the Chapter: Preface: Special issue dedicated to the International Conference on Reaction Engineering National Institute of Technology, Raipur, India
Publisher: De Grugter
Month and Year of Publication: May, 2022
Author's Name(S): Parmesh K. Chaudhari

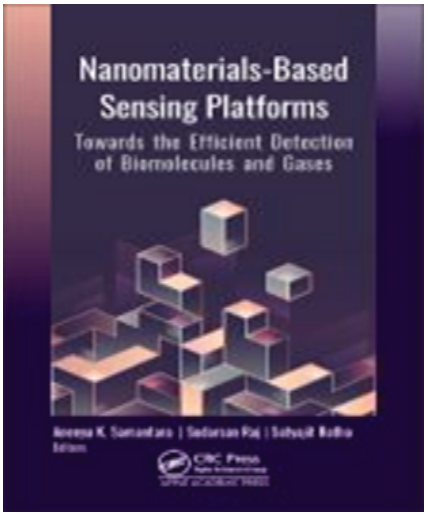


Reactions play an important role for Engineers and Chemists, and every industrial formulation is to be successfully validated in laboratory before large scale production. The role of catalysis, modified reactors and varying mechanism trials could lead to solution of present world energy crisis, product requirement, and environmental deterioration. With rapid increase in product formulation techniques all over the world, a well developed reaction methodology needs to be understood. Reaction engineering is indeed as an essential technical aspect for synthesizing any chemical product. Chemical reaction engineering aims at studying and optimizing chemical reactions in order to define the best reactor design.

For this,the interactions among flow phenomena, mass transfer, heat transfer, and reaction kinetics are of prime importance. Feed, compositions and operating conditions are also very important, as it affects the final product. Chemical reaction engineering approaches are indeed tailored for the development of new processes and the improvement ofexisting technologies.

PUBLISHED BOOKS & BOOK CHAPTERS

Title of the Book: Nanomaterials-Based Sensing Platforms: Towards the Efficient Detection of Biomolecules and Gases
Title of the Chapter: Optical Biosensors for Diagnostic Applications
Publisher: Apple Academics Press
Month and Year of Publication: April,2022
Author's Name(S): Sudha Kumari and Sapan Mohan Saini



Optical biosensors based on plasmonics are employed for sensing,using optical properties of metallic thin films or nanostructures. Surface Plasmon Resonance (SPR) sensing techniques are generally used for the detection of target chemical and biological molecules at the surface of metal thin film interfaced with dielectric medium. Due to its highly sensitive nature, SPR sensors have emanated as an influential sensing method in the biological sensor applications resulting in a very cost-effective way.

Plasmonics materials such as silver (Ag), gold (Au), and aluminum (Al), etc., consisting of thin films and nanostructures supports SPR at metal-dielectric interface. The properties of surface plasmon are very sensitive to the surrounding dielectric medium which is in contact with the metallic surface. In addition, the metal nanostructures help to confine the light which significantly increases the electric field, thereby enhancing the sensitivity of the sensing device. This makes SPR based plasmonic devices, a promising candidate for developing a label free optical biosensor. Additionally, the development of cost-effective, label free and highly sensitive optical biosensor is highly demanding for routine clinical diagnosis for fast and real-time identification of biomarkers specific to certain diseases, e.g., cancer, Alzheimer, and Tuberculosis (TB), etc.

PUBLISHED RESEARCH PAPERS (April - June 2022)

Title: Deformation monitoring of Surakachhar underground coal mines of Korba, India using SAR interferometry
Authors: H Govil, RS Chatterjee, Pralay Bhaumik, Neeraj Vishwakarma
Journal: Advances in Space Research
Web: https://doi.org/10.1016/j.asr.2022.05.018

Title: Contribution of L band SAR data for identification of buried/paleochannels in Jaisalmer region of Rajasthan, India
Authors: Himanshu Govil, Mahesh Thakur
Journal: Advances in Space Research
Web: https://doi.org/10.1016/j.asr.2022.03.036

Title: Groundwater flow modeling study to assess the sustainability of groundwater resource in and around Bemetara Block, Chhattisgarh, India
Authors: M Gobinath, Suvendu Kumar Sahu, Prahlad Ram, D C Jhariya
Journal: Journal of the Geological Society of India
Web: https://doi.org/10.1007/s12594-022-2048-4

Title: Frequently used allopathic and traditional medicine for COVID-19 treatment and feasibility of their integration
Authors: Aditya Upadhayay, Gopal Patel, Dharm Pal, Awanish Kumar
Journal: Springer Nature Singapore
Web: https://doi.org/10.1007/s11655-021-3512-5

Title: Noble metal–free doped graphitic carbon nitride (g-C3N4) for efficient photodegradation of antibiotics: progress, limitations, and future directions
Authors: Dhruti Sundar Pattanayak, Dharm Pal, Jyoti Mishra, Chandrakant Thakur
Journal: Environmental Science and Pollution Research
Web: https://doi.org/10.1007/s11356-022-20170-9

PUBLISHED RESEARCH PAPERS

Title: Experimental investigations of direct absorption solar collectors
Authors: Dhananjay Singh, Suresh Kumar Patel, Pradeep Kumar, Dharm Pal, Parag Thakur, Shriram S Sonawane
Journal: Applications of Nanofluids in Chemical and Bio-medical Process Industry
Web: https://doi.org/10.1016/B978-0-323-90564-0.00011-8

Title: Segmental variability of precipitation in the Mahanadi river basin from 1901 to 2017
Authors: Ramgopal T Sahu, Mani Kant Verma, Ishtiyaq Ahmad
Journal: Geocarto International
Web: https://doi.org/10.1080/10106049.2022.2091163

Title: Thin layer interface: an alternative to zero thickness interface for modeling of footing-soil interaction system
Authors: Gaurav D Dhadse, GD Ramtekkar, Govardhan Bhatt
Journal: Journal of Building Pathology and Rehabilitation
Web: https://doi.org/10.1007/s41024-022-00190-1

Title: Utility optimization-based multi-stakeholder personalized recommendation system
Authors: Rahul Shrivastava, Dilip Singh Sisodia, Naresh Kumar Nagwani
Journal: Data Technologies and Applications
Web: https://www.emerald.com/insight/content/doi/10.1108/DTA-07-2021-0182/full/html

Title: Low-dose COVID-19 CT image denoising using CNN and its method noise thresholding.
Authors: Manoj Diwakar, Neeraj Kumar Pandey, Ravinder Singh, Dilip Sisodia, Chandrakala Arya, Prabhishek Singh, Chinmay Chakraborty
Journal: Current Medical Imaging
Web: https://doi.org/10.2174/1573405618666220404162241

PUBLISHED RESEARCH PAPERS

Title: Transfer learning based lightweight ensemble model for imbalanced breast cancer classification
Authors: Shankey Garg, Pradeep Singh
Journal: IEEE/ACM Transactions on Computational Biology and Bioinformatics
Web: https://doi.org/10.1109/TCBB.2022.3174091

Title: Empirical investigation of hyperparameter optimization for software defect count prediction
Authors: Meetesh Nevendra, Pradeep Singh
Journal: Expert Systems with Applications
Web: https://doi.org/10.1016/j.eswa.2021.116217

Title: Email thread sentiment sequence identification using PLSA clustering algorithm
Authors: Ulligaddala Srinivasarao, Aakanksha Sharaff
Journal: Expert Systems with Applications
Web: https://doi.org/10.1016/j.eswa.2021.116475

Title: A strategic review on carbon quantum dots for cancer-diagnostics and treatment
Authors: Kaustubh Naik, Shilpi Chaudhary, Lei Ye, Avanish Singh Parmar
Journal: Frontiers in Bioengineering and Biotechnology
Web: https://doi.org/ 10.3389/fbioe.2022.882100

Title: A LSTM-FCNN based multi-class intrusion detection using scalable framework
Authors: Santosh Kumar Sahu, Durga Prasad Mohapatra, Jitendra Kumar Rout, Kshira Sagar Sahoo, Quoc-Viet Pham, Nhu-Ngoc Dao
Journal: Computers and Electrical Engineering
Web: https://doi.org/10.1016/j.compeleceng.2022.107720

PUBLISHED RESEARCH PAPERS

Title: An optimal sensor location based protection scheme for DER-integrated hybrid AC/DC microgrid with reduced communication delay
Authors: Awagan Goyal Rameshrao, Ebha Koley, Subhojit Ghosh
Journal: Sustainable Energy, Grids and Networks
Web: https://doi.org/10.1016/j.segan.2022.100680

Title: Design of AC state estimation based cyber-physical attack for disrupting electricity market operation under limited sensor information
Authors: Prasanta Kumar Jena, Subhojit Ghosh, Ebha Koley, Dusmanta Kumar Mohanta, Innocent Kamwa
Journal: Electric Power Systems Research
Web: https://doi.org/10.1016/j.epsr.2021.107732

Title: Dual boost five-level switched-capacitor inverter with common ground
Authors: Vishal Anand, Varsha Singh, Jagabar Sathik Mohamed Ali
Journal: IEEE Transactions on Circuits and Systems II: Express Briefs
Web: https://doi.org/10.1109/TCSII.2022.3169009

Title: A systematic review on DC-microgrid protection and grounding techniques: Issues, challenges and future perspective
Authors: Manohar Mishra, Bhaskar Patnaik, Monalisa Biswal, Shazia Hasan, Ramesh C Bansal
Journal: Applied Energy
Web: https://doi.org/10.1016/j.apenergy.2022.118810

Title: A Time-Frequency based backup protection scheme for enhancing grid security against power system blackout
Authors: Kasimala Venkatanagaraju, Monalisa Biswal
Journal: International Journal of Electrical Power & Energy Systems
Web: https://doi.org/10.1016/j.ijepes.2021.107780

PUBLISHED RESEARCH PAPERS

Title: A passive communication based islanding detection technique for AC microgrid
Authors: Ruchita Nale, Monalisa Biswal, Nand Kishor
Journal: International Journal of Electrical Power & Energy Systems
Web: https://doi.org/10.1016/j.ijepes.2021.107657

Title: Modified complete ensemble empirical mode decomposition based HIF detection approach for microgrid system
Authors: M. Biswal, Ch. Durga Prasad, P. Ray, and Nand Kishor
Journal: Int. Journal of Electrical Power and Energy system
Web: https://www.sciencedirect.com/science/article/pii/S0142061522002824

Title: Savitzky-Golay filter integrated matrix pencil method to identify high impedance fault in a renewable penetrated distribution system
Authors: M. Biswal, M. Mishra, and V. K. Sood, R. C. Bansal, A. Abdelaziz
Journal: Electric Power System Research
Web: https://www.sciencedirect.com/science/article/abs/pii/S0378779622002814

Title: A resilient protection scheme for common shunt fault and high impedance fault in distribution lines using wavelet transform
Authors: Bhatnagar, Maanvi; Yadav, Anamika; Swetapadma, Aleena
Journal: IEEE System Journal
Web: https://doi.org/10.1109/JSYST.2022.3172982

Title: A Mathematical model of intraguild predation with prey refuge and competitive predators
Authors: SN Raw, Barkha Tiwari
Journal: International Journal of Applied and Computational Mathematics
Web: https://doi.org/10.1007/s40819-022-01366-6

PUBLISHED RESEARCH PAPERS

Title: Photoluminescence and energy transfer mechanism in Y6Ba4(SiO4)6F2 apatite phosphors doped with cerium and terbium
Authors: Pailendra Kumar Sahu, Sadhana Agrawal
Journal: Bulletin of Materials Science
Web: https://doi.org/10.1007/s12034-022-02705-5

Title: Judd–Ofelt analysis and photoluminescence properties of europium-activated Y8−x Sr2(SiO4)6O2 oxyapatite phosphors
Authors: Ritu Gupta, Sadhana Agrawal
Journal: Journal of Materials Science: Materials in Electronics
Web: https://doi.org/10.1007/s10854-022-08597-9

Title: Understanding the strategies to attain the best performance of all inorganic lead-free perovskite solar cells: Theoretical insights
Authors: Priyanka Roy, Ayush Khare
Journal: International Journal of Energy research
Web: https://doi.org/10.1002/er.8287

Title: Role of built-in potential over ETL/perovskite interface on the performance of HTL-free perovskite solar cells
Authors: Numeshwar Kumar Sinha, Dhriti S Ghosh, Ayush Khare
Journal: Optical Materials
Web: https://doi.org/10.1016/j.optmat.2022.112517

Title: Design and simulation of efficient tin based perovskite solar cells through optimization of selective layers: Theoretical insights
Authors: Priyanka Roy, Yassine Raoui, Ayush Khare
Journal: Optical Materials
Web: https://doi.org/10.1016/j.optmat.2022.112057

PUBLISHED RESEARCH PAPERS

Title: Women and brains go together: Mapping Sophia Kovalevsky's Animus in Alice Munro's 'Too Much Happiness'.
Authors: Suparna Karkun, Anoop Kumar Tiwari
Journal: JOURNAL OF INTERNATIONAL WOMEN'S STUDIES
Web: https://vc.bridgew.edu/jiws/vol24/iss1/29

Title: Design and investigation of split (n / n -) buffer layer semi-superjunction IGBT
Authors: Namrata Gupta, Prannoy Roy, Alok Naugarhiya
Journal: Applied Physics A
Web: https://doi.org/10.1007/s00339-022-05497-x

Title: Brain tumor segmentation and classification in MRI using clustering and Kernel-Based SVM
Authors: Anil Kumar Mandle, Satya Prakash Sahu, Govind Gupta
Journal: Biomedical and Pharmacology Journal
Web:https://biomedpharmajournal.org/vol15no2/brain-tumor-segmentation-and-classification-in-mri-using-clustering-and-kernel-based-svm/

Title: Role of built-in potential over ETL/perovskite interface on the performance of HTL-free perovskite solar cells
Authors: Numeshwar Kumar Sinha, Dhriti S Ghosh, Ayush Khare
Journal: Optical Materials
Web: https://doi.org/10.1016/j.optmat.2022.112517

Title: Design and simulation of efficient tin based perovskite solar cells through optimization of selective layers: Theoretical insights
Authors: Priyanka Roy, Yassine Raoui, Ayush Khare
Journal: Optical Materials
Web: https://doi.org/10.1016/j.optmat.2022.112057

PUBLISHED RESEARCH PAPERS

Title: Investigation of carrier transport materials for performance assessment of Lead-Free Perovskite Solar Cells
Authors: S. Bhattarai, R. Pandey, J. Madan, A. Mhamdi, A. Bouazizi, D. Muchahary, D. Gogoi, A. Sharma, and T. D. Das
Journal: IEEE Transactions on Electron Devices
Web: https://doi.org/10.1109/TED.2022.3165516

Title: Brain tumor segmentation and classification in MRI using Clustering and Kernel-Based SVM
Authors: Anil Kumar Mandle, Satya Prakash Sahu, Govind Gupta
Journal: Biomedical and Pharmacology Journal
Web: https://biomedpharmajournal.org/vol15no2/brain-tumor-segmentation-and-classification-in-mri-using-clustering-and-kernel-based-svm/

Title: Optimized convolutional neural network for road detection with structured contour and spatial Information for intelligent vehicle system
Authors: Deepak Kumar Dewangan, Satya Prakash Sahu
Journal: International Journal of Pattern Recognition and Artificial Intelligence
Web: https://doi.org/10.1142/S0218001422520024

Title: Machine learning based COVID-19 disease recognition using CT images of SIRM database
Authors: Saroj Kumar Pandey, Rekh Ram Janghel, Pankaj Kumar Mishra, Rachana Kaabra
Journal: Journal of Medical Engineering & Technology
Web: https://doi.org/10.1080/03091902.2022.2080883

Title: An empirical review on evaluating the impact of image segmentation on the classification performance for skin lesion detection
Authors: Lokesh Singh, Rekh Ram Janghel, Satya Prakash Sahu
Journal: IETE Technical Review
Web: https://doi.org/10.1080/02564602.2022.2068681

PUBLISHED RESEARCH PAPERS

Title: MOHSA-Fuzzy-based optimized message dissemination technique for delay tolerant networks
Authors: Nidhi Sonkar, Sanjay Kumar, and Sudhakar Pandey
Journal: National Academy Science Letters
Web: https://doi.org/10.1007/s40009-022-01129-3

Title: Deep learning-based energy-efficient computational offloading strategy in heterogeneous fog computing networks
Authors: Indranil Sarkar and Sanjay Kumar
Journal: The Journal of Supercomputing
Web: https://doi.org/10.1007/s11227-022-04461-z

Title: Reliable data exchange in vehicular DTNs using AI-based hybrid trust management
Authors: Vishakha Chourasia, Sudhakar Pandey, and Sanjay Kumar
Journal: International Journal of Communication Systems
Web: https://doi.org/10.1002/dac.5197

Title: A framework to detect DDoS attack in Ryu controller based software defined networks using feature extraction and classification
Authors: Ravindra Kumar Chouhan, Mithilesh Atulkar, N.K. Nagwani
Journal: Applied Intelligence
Web: https://doi.org/10.1007/s10489-022-03565-6

Title: Predication of temperature distribution and strain during FSW of dissimilar aluminum alloys using Deform 3D
Authors: S. Raju, Jagadish, C. J. Rao, S.K. Aadapa, Sagar Yanda
Journal: Materials Today: Proceedings
Web: https://doi.org/10.1016/j.matpr.2022.04.371

PUBLISHED RESEARCH PAPERS

Title: Augmenting the productivity of tubular solar still using low-cost energy storage materials
Authors: Ritesh Krishna Sambare, Satish K Dewangan, Pankaj K Gupta, Sandeep Joshi
Journal: Environmental Science and Pollution Research
Web: https://doi.org/10.1007/s11356-022-21324-5

Title: Numerical simulation for energy consumption and thermal comfort in a naturally ventilated indoor environment under different orientations of inlet diffuser
Authors: Ghogare Abhijeet Ganesh, Shobha Lata Sinha, T N Verma, Satish K Dewangan
Journal: Building and Environment
Web: https://doi.org/10.1016/j.buildenv.2022.109071

Title: Review on various borehole cleaning parameters related to oil and gas well drilling
Authors: Vivek Deshmukh, Satish Kumar Dewangan
Journal: Journal of the Brazilian Society of Mechanical Sciences and Engineering
Web: https://doi.org/10.1007/s40430-022-03501-2

Title: Effect of spherical internal surface irregularities (SISIs) on thermohydraulic features of modified SSWH riser tube flow
Authors: Satish Kumar Dewangan
Journal: International Journal of Energy and Environmental Engineering
Web: https://doi.org/10.1007/s40095-021-00396-y

CONFERENCES / STTPs ORGANIZED

RESEARCH SCHOLARS' CONCLAVE 2022

NIT Raipur conducted a three-day multidisciplinary Research Scholars' Conclave from 28th June 2022 to 30th June 2022. The objective of the conclave was to provide research scholars with a valuable learning experience, and proper guidance to publish their articles in reputed journals and conferences. Dr. A. M. Rawani, Director, NIT Raipur was the Patron, and Dr. Prabhat Diwan, Dean (Research and Consultancy) was the Chairperson of the event. Organizing secretaries of the conclave were Dr. A. Yadav, Associate Dean, R&C ; Dr. A. Kumar, Assistant Professor, Department of Biotechnology and Dr. T. P. Sahu,Department of Information Technology Assistant Professor. The speakers of the conclave were Dr. S. Srivastav, Publishing Director Journals, Springer Nature, and Dr S. K. Satpathy, Deputy Librarian, NIT Raipur. More than 250 papers were Presented in five parallel sessions under Various Research Groups. Best Research Paper Awarded to Pallavi Pradeep Khobragade, CE for Group-1, Sathish Kumar Adapa, ME for Group-2, Neelam Agrawal, MCA for Group-3, Nitish Kumar, ECE for Group-4, and Pritish Behera, HHS for Group-5.

UPCOMING EVENTS

Title: Online Faculty Development Programme (FDP) on "Data Science for engineering applications: Theory and Practice"

Duration: July 11 - July 20,2022

Organizing Department: Computer Science and Engineering

Organizing Secretries: Dr. Jitendra Kumar Rout, Dr. Sanjaya Kumar Panda

Participants: Faculty and Research Scholars, Industry Participants

Registration Fee: Faculty and Research Scholars Rs. 750/- and Industry Participants Rs. 2250/-

"Electronics and ICT Academy" was set up at NIT Warangal with financial assistance from MeitY, GoI. The jurisdiction of this academy is Telangana, Andhra Pradesh, Karnataka, Goa, Puducherry and Andaman and Nicobar Islands. This academy is role is to offer Faculty Development Programmes (FDPs) in standardized courses and emerging areas of electronics, information communication technologies, training and consultancy services for industry, curriculum development for industry, CEP for working professionals, advice and support for technical incubation and entrepreneurial activities. This online FDP is devoted to address the need to enhance knowledge about the latest developments pertaining to Data Science for Engineering Applications: Theory and Practice. It will be conducted in the Department of CSE, NIT Raipur, Raipur – 492010, Chhattisgarh. The whole course will be handled by academicians and industry experts.

UPCOMING EVENTS

Title: International Conference on Emerging Application of Nanobiotechnology (ICEAN- 2022)

Duration: August 4 - 5,2022

Organizing Department: Biotechnology

Organizing Secretries: Dr. Awanish Kumar, Dr. Sharda Bharti and Dr. Chinmaya Mahapatra

Participants: Perusing PG or higher courses in any interdisciplinary filed of Biological Science

Registration Fee: : For Industrialists 2000 Rs. /-, for Faculty members 1500 Rs. /-, for Students / Research Scholars 1000 Rs. /- ;Plus GST @ 18% is applicable

An International Conference on "Emerging Application of Nanobiotechnology" is being organized and sponsored by the Institute. The objective of the conference is to provide young researchers and students with a comprehensive understanding of fundamental issues and application of Nanobiotechnology with high intensity. The topics will include medical nanotechnology, environmental nanotechnology, cancer biology, drug discovery, environmental microbiology, biosensors, bioremediation, agricultural nanomedicines, disease diagnosis, tissue engineering.

UPCOMING EVENTS

Title: A Certificate course on "Applied Data Analytics: A Practical Approach" (Online mode).

Duration: June 14 - 15,2022

Organizing Department: Continuing Education Cell, NIT Raipur

Organizing Secretries: Dr. Subhojit Ghosh, Dr. Gobind P. Gupta and Dr. Mridu Sahu

Participants: Students,Faculty and Industry Personnel

Registration Fee: Students of NIT Raipur Rs. 750 /-, Outside Students (other than NIT Raipur) Rs. 1000 /-, Faculty/ Industry Personnel Rs. 2500 /-, plus @ 18% GST

The main objective of the course is to help the participants in developing a solid understanding of the Data Science and Analytics techniques like data pre-processing, predictive analysis, fundamental of data statistics, machine learning techniques and data visualization etc., with the help of emerging data analytics tools like Python/R. The mathematical foundation for analyzing the data will add more knowledge about the data and this will help for decision support systems. This certificate course will help to enhance the knowledge of the participants in the field Data Science and Analytics. This course focuses on the delivery of lectures with full practical approach, case studies and by hands-on practical sessions on diversified range of topics related to Data Science and Analytics.

UPCOMING EVENTS

Title: One Week Self-Financed Short Term Training Program on "Aesthetic of Scientific Writing Using LaTeX" (Online Mode).

Duration: July 4 - 8,2022

Organizing Department: Computer Science and Engineering

Organizing Secretries: Dr. Dilip Singh Sisodia, Dr. Jitendra Kumar Rout, Dr. Aakanksha Sharaff

Participants: UG/PG students, Ph.D. scholars and researchers, Faculty members from academic institutes, Industry professionals and consultants.

Registration Fee: Students 500/- , Faculty, Academicians, Industry participants 750 /- plus @ 18% GST

Competence in technical writing holds great importance in the present era. LaTeX is a document typesetting system that is used to produce high quality scientific documents like articles, books, dissertations, technical reports, etc. Expertise in drafting technical documents is an indispensable skill for all professionals as it helps them to share their knowledge of technical subjects effectively in all domains of society and thus makes them competent in their professional careers. This five days' workshop has been designed to provide a clear understanding of the basics of technical writing which will enable the participants to communicate their ideas effectively in the form of technical reports, journal papers etc., by using the technical writing tool LaTeX.

UPCOMING EVENTS

Further, Beamer is a LaTeX document for creating slides for presentations. Real time collaborative writing and publishing tool 'Overleaf' will be discussed. In addition topics on drawing, data analysis and graphing software will be covered for making high quality figures and diagrams. The workshop will include sessions by experts who will focus on topics like innovative methods for enhancing one's technical writing skills, use of technical terminology for information transfer, satisfying document specifications like style and format, page layout and organizational structure, and principles of accuracy and clarity.

Evolution of Friction Stir Welding from Ancient era to Present age

Mrinal Sahu and Subhas Ganguly
Department of Metallurgical and Materials Engineering, National Institute of Technology Raipur

With the primary aim to achieve a continuous and desired junction in the complex engineering structures, resultes in the evolution of welding. The history of welding can be traced back to the ancient of time. The Bronze Age has the earliest evidence of welding, more than 2,000 years ago. The eastern Mediterranean region's inhabitants and the Egyptians learnt to join bits of iron throughout the Iron Age in around 1000 B.C. During of World War I and at the end of the 19th century, the world witnessed the first significant attempt to widely employ the joining of two different material[1].

This was the time when variety of techniques like gas welding, arc welding, friction welding, resistance welding etc., all made their debuts, depending upon the application needed. Since then, defense equipment and safety have seen major advancements and presently blacksmiths and jewelers are also implementing welding. The arc welding process was fully established by 1916, and the welding method utilized back then is still in use today. It wasn't until World War II that arc welding became widely used because of enormous demands of quick methods of construction for ships, power plants, transportation, and constructions[2].

Resistance welding has more than 130-year old history, and it is now widely employed in industrial, automotive, and aerospace applications. Even with all the innovations made by Thomson and others, contemporary electric welding did not really take off until the early 20th century, when electricity became widely accessible[3].

Electric welders relied on big batteries in the days before it was simple to acquire AC electricity, which restricted their use. Arc welding became practical for the majority of applications when the existing electric-powered welding technologies were paired with the widely available electricity. However, due to frequent cracking of essential joints such as those in shipbuilding, were not welded before World War I [4].However, the demand for quick, high-quality welds for the military during World Wars I and II spurred important developments, leading to significant arc welding advancements.

The foundational components of the engineering and related sectors are metals and their alloys, which are essential in structural work, transportation, shipbuilding and automobile industries, and even in agriculture. It can be challenging for engineers to keep up with the rapid breakthroughs in the analysis and design of complex engineering structures. But various related applications, including high -rise buildings, roofs, bridges, geotechnical structures, aged nuclear infrastructure, offshore structures, encourages cross-fertilization of welding techniques, along with performance assessment from one engineering discipline to other by providing a state-of-the-art techniques[5].

Friction Stir Welding (FSW), is a relatively recent method of solid-state joining method which is flexible, environment friendly, and energy-efficient. It can be used to combine metallic alloys, such as high-strength aerospace aluminium alloys, that are challenging to weld with traditional fusion welding.The most important advancement in metal joining in a decade is thought to be FSW, which alters the microstructure of metallic materials and eventually effects the mechanical properties of the material[6]. Even though the majority of the data relates to alloys made of aluminium, however, the current research trends focus on the exploration of new welding materials such as dissimilar materials or composites are also available[7].At this point, the fundamental knowledge of microstructural evolution at different zones with the FSW process is illustrated in the Figure 1.

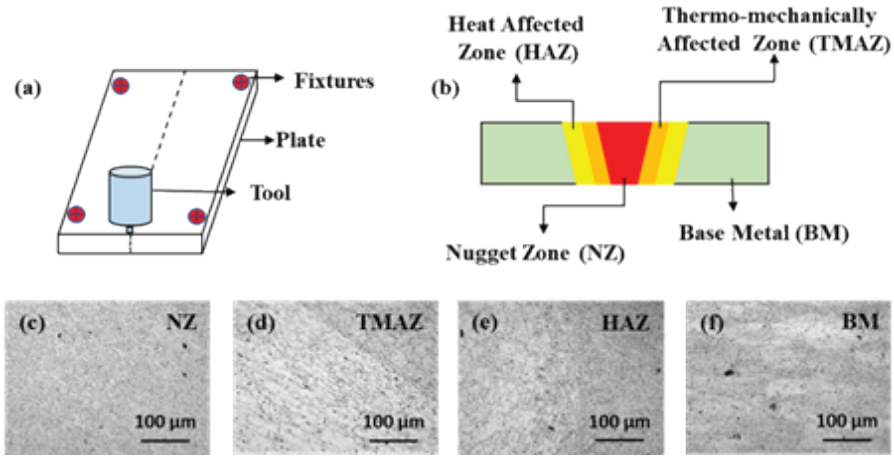


Figure 1: Schematic illustration of Friction Stir Welding process.
(a) Experimental welding setup;
(b) Different weld zones in FS weld cross-section;
(c)-(f) Microstructures of NZ, TMAZ, HAZ and BM of weld cross-section respectively

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Silver Nanoparticle: An Excellent Nano-Biocide towards Coronavirus Prevention and Control

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INTRODUCTION

Clean drinking water is indispensable for our health. Occurrence of viruses in potable water sources often remain unnoticed and hence their subsequent consequence on human health is also ignored. Viruses, particularly enteric viruses are also known to be present in natural as well as treated water and waste water. More than 140 enteric viruses have been identified in human feces. Various types of viruses, such as enteric viruses, adenovirus, rotavirus, norovirus, and hepatitis A virus are commonly observed in both surface and groundwater sources.

However, in most cases, viruses are not tested on routine basis or prior to distribution of treated water to the consumer. These viruses may cause moderate to severe effect on human health, as reported by the WHO. It has been reported that most viruses are commonly associated with gastroenteritis and can cause various symptoms like diarrhea. Various properties of waterborne viruses due to the differences in their genome and capsid proteins make them of particular concern with respect to disease outbreak. Various other viruses, such as, coronaviruses and influenza can also be transmitted through potable water through inhalation /skin contact.

Recently, coronavirus disease 2019 (COVID-19) created devastating effects all over the world. It is caused by the highly contagious severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Coronaviruses is an RNA virus and cause a several diseases in birds and mammals and are the major pathogen of emerging respiratory disease outbreaks since 2020 due to direct transmission of SARS-CoV-2 virus, the causative agent of coronavirus disease (COVID-19) from one person to another. COVID-19 has developed into a pandemic with millions of patients getting severely infected within a month from the time of its suspected outbreak across the globe. Considering these characteristics of viruses, viruses may also be transmitted from drinking water via inhalation or skin and eye contact thus causing disease outbreak of viral gastroenteritis, respiratory and ocular infections. This may also cause adverse effect on public health due to the presence of enteric viruses.

Hence, studies to test removal of viruses from treated water is of utmost importance and viruses in natural as well as manmade environments must be removed or inactivated prior to distribution to the consumer from health safety perspectives.

Due to its asymptomatic carrier-based mode of transmission, currently available testing facility are facing challenges in its detection. The effects of this virus are still not clearly inhibited by any clinically tested therapy approaches, and COVID-19 vaccine development is currently ongoing since new strains of the virus appear so regularly. Therefore, it is necessary to investigate the methods for increasing testing capabilities, creating efficient therapies, and creating secure vaccines that offer long-lasting protection. Numerous medical applications, including biosensing, drug administration, imaging, and antimicrobial therapy, utilise nanoparticles (NPs) extensively. A wide range of conventional techniques have been broadly employed for viral inactivation and removal. However, they are unable to achieve complete inactivation of viruses. Hence, treatment using an efficient antimicrobial agent having potent antiviral property is a prerequisite to ensure distribution of

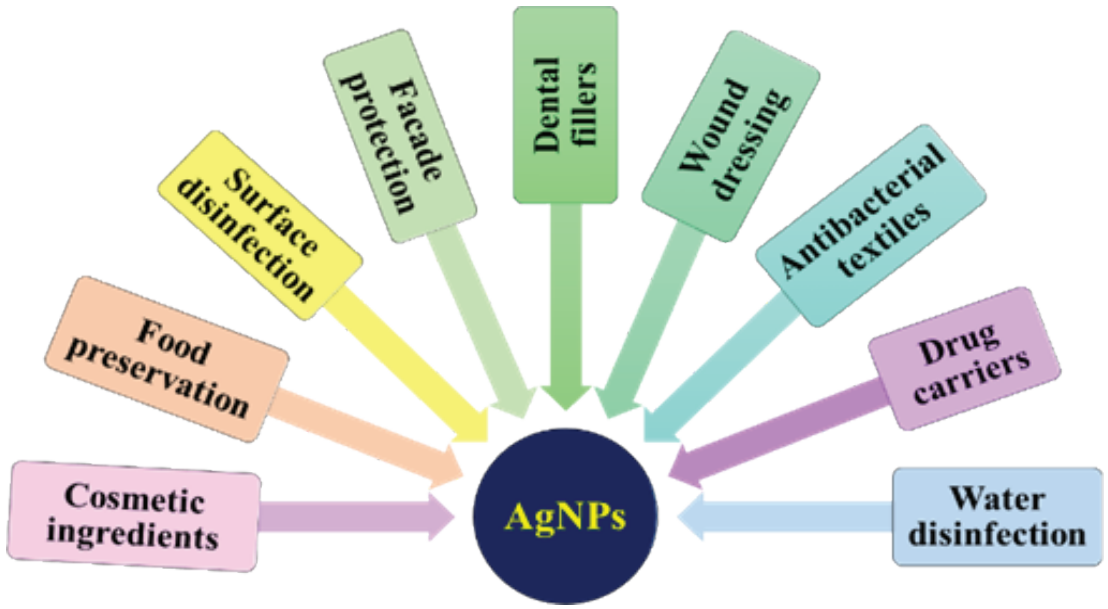

Figure 1: Broad-spectrum antimicrobial applications of silver nanoparticles (AgNPs)

completely safe water to the consumer. With emerging application of nanotechnology, silver nanoparticles can be explored for such applications (Figure 1). Among various nanomaterials, silver nanoparticles are being reported to possess broad-spectrum antimicrobial property, including potent antiviral activity.

Although several researchers have reported the potential application of AgNPs in their colloidal form, only a few studies have shown antiviral efficacy using immobilized silver nanoparticles. Hence, bacteriophage inactivation efficacy of colloidal AgNPs and AgNP immobilized-glass substrate was tested using two model bacteriophages by conducting batch mode disinfection studies.

ANTIVIRAL APPLICATION OF SILVER NANOPARTICLES

The antiviral activity of silver NPs (AgNPs) towards viral inactivation is of paramount importance among the various types of metallic NPs. In eukaryotic cells, AgNPs exhibit low toxicity, biocompatibility, and broad-spectrum antibacterial action. The in-vitro research on the effectiveness of AgNPs still needs to be explored against different viruses, such as, SARS,CoV-2. In general, the antiviral effectiveness of AgNPs is tested against model bacteriophages, i.e., MS2 and T4 bacteriophage as indicator of enteric viruses (Figure 2). MS2 is an F-specific coliphage (ssRNA virus, 27 nm diameter) and T4 bacteriophage is a somatic coliphage (dsDNA virus, 90 nm wide and 200 nm long). The bacteriophage inactivation efficacy of colloidal AgNPs was determined by exposing each of the bacteriophage with an initial concentration as 103-104 PFU/ml in the presence of varying concentration of AgNPs in suspension (0–60 µg/ml) and the flasks were incubated in a rotary shaker at 150 rpm and 37oC. The effectiveness of the AgNP-immobilized glass substrate against bacteriophage was tested in a batch reactor containing 100 ml artificially contaminated water and the viability of bacteriophage was checked using the double layer agar assay. Decreasing PFU is indicative of either loss of infectivity or disintegration/destruction of the viruses.

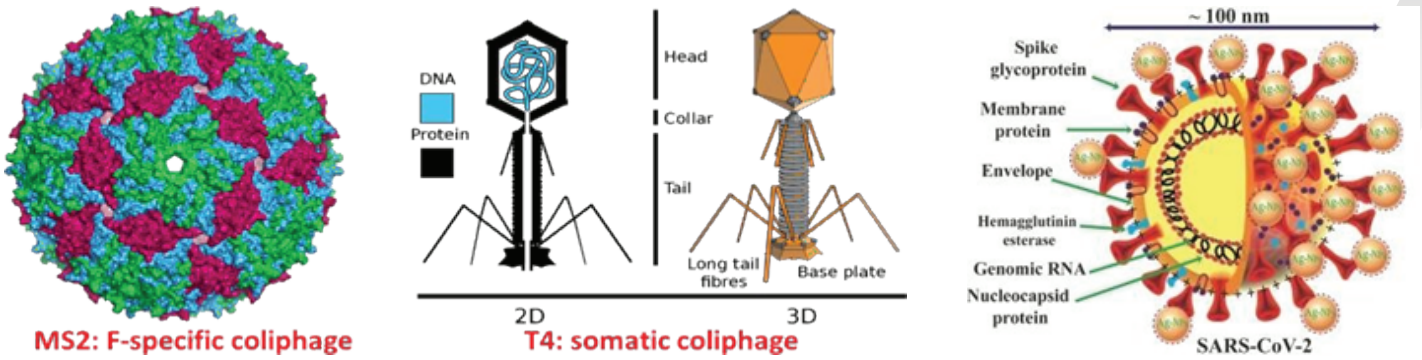

Figure 2: Structure of a few viruses [3]

It was observed that the time of complete inactivation of bacteriophage reduced with increase in concentration of AgNPs for both the bacteriophages. AgNP concentration of 60 µg/ml was able to completely inactivate MS2 and T4 bacteriophage within 30 and 50 minutes respectively. Batch mode viral inactivation studies were conducted in a batch reactor containing AgNP immobilized glass substrate which exhibited good potential for bacteriophage inactivation. Complete inactivation showing 3 log reduction was achieved within 70 and 80 min for both MS2 and T4 bacteriophage, respectively. T4 bacteriophage was found to be more resistant as compared to MS2. This may be attributed to its double stranded DNA genome. As the antiviral effect of AgNPs is known to be affected by their morphology, capping agent used, and concentration of viral strains used, the overall antiviral efficacy is also likely to vary based on the type of viruses and the media in which they are present.

MECHANISM OF ACTION OF AGNPS TOWARD VIRAL INACTIVATION

Although the exact mechanism for AgNP based inactivation is not defined yet, the removal by bacteriophage may be attributed to interactions of amino acids of viral surface proteins with silver. It has been reported that silver has a high affinity for sulfur moieties, and there are 183 cysteine residues exposed on the MS2 capsid surface. The sulfur moieties of cysteine residue may have interacted with the AgNPs/silver ions generated in the medium. Other mechanisms may include silver ions released and ROS generated in the system. In this case, different behavior between the two phages may be due to the differences in the composition of the viral components or capsid proteins including the contents of thiol groups. This could be a significant factor in determining their susceptibilities.

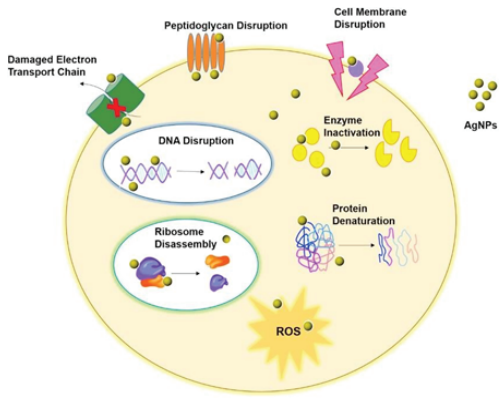

Figure 3: Possible mechanisms of the antiviral activity of silver nanoparticles [1].

A proposed mechanism of viral inactivation is depicted in the Figure 3. T he release of progeny virions is inhibited by AgNPs attachment to the viral genome, which blocks the activity and interaction of several viral and cellular replication-related components. By preventing the connection between the SARSCoV-2 spike protein and the angiotensin-converting enzyme-2 (ACE2) receptor, the nanomaterials can specifically and irreversibly decrease corona virus infectivity. Additionally, by assessing several physiochemical characteristics such size, shape, surface charge, dispersity, and protein corona effects, AgNPs can interact with viruses more effectively

The concentration of silver released from the AgNP-immobilized substrate while disinfection in batch mode was found to be well below the standard discharge limit for silver demonstrating minimal environmental risks. Hence, silver nano particle-based nano-biocide can serve as a potent antiviral agent against broad range of viruses.

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PANCH KOSH : FIVE LAYERS OF HUMAN EXISTENCE

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Beyond the senses are the objects; beyond the objects is the mind
Beyond the mind, the intellect; beyond the intellect, the Atman,
Beyond the Atman, the non-manifest, the Sprit; Beyond the Sprit there is nothing,
This is the End, The Pure Consciousness.

KATH UPNISHAD

The concept of panchakosha first appeared in the Taittiriya Upanishad as a dialogue between Guru Varuna and disciple Bhrigu. In which, disciple Bhrigu wants to know that "what is the most fundamental element of this universe from which all creation has arisen". The Guru directed him for inner research (tapas). This is where the knowledge of the five layers of man begins.
These are:

1. **Annamaya kosha (physical Sheath)**
2. **Pranamaya kosha (vital Sheath)**
3. **Manomaya kosha (mental Sheath)**
4. **Vigyanamaya kosha (wisdom Sheath)**
5. **Anandamaya kosha (Bliss Sheath)**

ANNAMAYA KOSHA (PHYSICAL SHEATH)

First experience of Bhrigu is that the whole universe is made up of 'anna' (matter). Everything comes out from Anna, sustained by Anna and dissolves into Anna. Our body is anamayakosha, which is nourished by food. This whole body is the result of food only. Therefore, the whole body can be transformed by purifying the food. Pure (balanced) food is that which gives energy to the body, does not give intoxication. Because whatever we eat creates and energizes seven corer cells.

PRANMAYA KOSH (VITAL/ ENERGY SHEATH)

Again after a long Tapas, sage Bhrigu realized that this is the Pran-life energy, from which the gross Annamayakosha also comes. Einstein says,-matter and energy are synonymous ; matter is energy and energy is matter-two states of one thing. Prana is the basic life principle. We believe that everything in the universe has life. Without Prana neither life on earth is possible nor is the existence of anything else. The purpose of Pranayama is to expand the 'Prana' and manifest the divinity in life. As per the yogic concept Prana is divided into five parts and these five parts are flowing in astral channels (Nadis) which control and sustain our entire biological system. These are :

1. **Prana- respiration, converts food into vital food**

2. **Apan - excreation, exhalation**

3. **Saman- assimilation, digestion and distribution**

4. **Vyan - blood circulation**

5. **Udan- gives lightness to the body and separates astral body from the physical body at the time of death**.

Pressure and tension in the mind, restricts the flow of Prana in the Nadis (channels). These astral Nadis are related to the nervous system and chemical controller, due to lack of proper flow of Prana in the Nadis, there is chemical disturbance, which is turn affects the organs and becomes the cause of physical diseases. Swami Vivekanand says- if we can control our breath we can control our Prana. If we can control our Prana we can control our mind. Control over mind can attain the liberation.

MANOMAYAKOSH (MENTAL SHEATH)

Third realization of RishiBrigu was "Manas (mind) is the source of everything" As we have understood, the first body is made of food, and the second body is made of Pranic energy. Similarly, the third body is made up of waves of thought. Thought is the food for the mind as well as the power. Because creative power is strong in it. Buddha says- 'Whatever you think, you will become; or the way you

have become is the result of your thinking'. Manomayakosha is a very big collector, without our knowing, continuously creates 'thought body'. Language, words, ideas, newspapers, wall posters, advertisements and media all are influencing our thoughts in some way or the other and we are full of things which we deny.

The balance of PranamayaKosha is helpful in controlling our emotions. Because our breathing is closely linked with our emotions. If the breathing is irregular the minds are disturbed and if the breathing is regular the minds are calm. Pranmay Kosh plays a substantial role in calming the mind.

VIJANANAMAYA KOSHA (WISDOM SHEATH)

This is the fourth layer of the five koshas. Sage Bhrigu comes to know that 'this universe is made up of 'consciousness'. "The third body is made up of thoughts and the fourth body is made up of consciousness; this includes intuition and intelligence. It is the carrier of the Koshas of understanding, knowledge, direct perception, intuition and creativity. Hunger, sleep, fear, reproductive instincts are common to humans and animals. The consciousness or awareness inherent in all human beings guides him to discriminate between "good and bad", "right and wrong", "useful and not useful". It is a thoughtful faculty. Thoughts are controlled when consciousness develops. Music, monotony, harmony of thoughts etc. develop the power of consciousness. This is the level of thinking where the direction of thoughts is decided. It can be developed through meditation. Meditation is a simple process of watching your own mind. Not fighting with the mind, nor trying to control it, just remaining there as an impartial witness. Then the miracle happens. Thoughts gradually become less and less and the seeker becomes conscious and aware.

ANANDAMAYA KOSH (BLISS SHEATH)

This is the bliss layer of our existence. This is the End, the level of Pure Consciousness, infinite knowledge, peace and bliss. It is a state, not an exercise. That state of consciousness, which flows continuously without any interruption, 'Tail Dharavat', Shunya fir Bhi Sangeet, like a flute.

Bhrigu was engrossed in this deep bliss (Ananda). This Shunya, Pure Consciousness, are the basic element of the universe,from which the whole universe originated. In the Isha Vasya Upanishad it is said that

ॐ पूर्णमदः पूर्णमदिं पूर्णात् , पूर्ण मुदच्यते,
पूर्णस्य पूर्णमादाय, पूर्ण मेवा वशष्यिते|
ॐ शांतिः शांतिः शांतिः ईश उपनषिद

Meaning:

The invisible, the cosmic consciousness, is the Whole; the visible, the phenomenal universe, too, is the Whole. From the Whole, the Whole has come. The Whole remains the same, even after the Whole comes out of the Whole

See The Bliss - From Through Yoga. RIG VEDA

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