Publications

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Doctoral Thesis

- **Title**: Scanning Tunneling Microscopic and Spectroscopic Investigations of Colossal Magnetoresistive Manganites;
- **Affiliation**: Department of Physics and Meteorology, Indian Institute of Technology Kharagpur;
- **Supervisors**: Prof. Balbir Kumar Mathur and Padma Shri Prof. Kasturi Lal Chopra.

Doctoral Thesis Supervised

1. **Beauty Pandey**, "*Effect of Incorporation of Nickel Nanoparticles in Diamond like Carbom Matrix*", September 2013.

2. **Somnath Mahato**, "*Fabrication and Performance Studies of CdSe, PEDOT:PSS and TMO Thin Films and Devices for Solar Photovoltatic Applications*", March 2016.

3. **Dhritiman Banerjee**, "*Quantum Phenomena Correlated Luminescence in Polymer Blends and Metal Oxide Composites for Applications in Optoelectronic Devices*", July, 2020.

4. **Kazi Hasibur Rahman**, "*Development of composite and doped TiO2 nanomaterials for the UV and visible light driven photocatalysis for waste water detoxification*", June, 2021.

5. **Lakshmi Kumari**, "*Tailoring of Photophysical Phenomena in Chemically Synthesized ZnO, ZnS and CdS Based II-VI Binary and Ternary Nanomaterials for Application in Light Emitting Diodes*", September, 2021.

6. **Mukesh Kumar Pandey**, "*Magnetic Phenomena in Electrodeposited Ni-C Nanocomposite Thin Films*", September, 2021.

7. **Sayari Biswas**, "*Hydrothermally and MOCVD Grown Nanostructured TiO2 Thin Films and Their Performances in Photocatalysis and DSSC*", October, 2021.

8. **Smita Dey**, "*Photophysical Interactions in PPy, PMMA and ZnO Based Polymer Blends and Polymer Metal-oxide Nanocomposites for PLED Application*", January, 2022.

9. **Keya Sahu,** "*Morphology Controlled Nanostructured Polyaniline, ZnO and Their Composites for Photocatalysis Application*", September, 2022.

Articles in Journals

1. "Observation of Deviation of Electronic Behavior of Indium Tin Oxide Film at Grain Boundary Using Scanning Tunneling Microscope" by S. Kasiviswanathan, V. Srinivas, A. K. Kar, B. K. Mathur and K. L. Chopra. *Solid State Communications*, **101**, 831, 1997.

2. "Deposition of $Ag_{0.5}Cu_{0.5}InTe_2$ Thin Films Using a Step-wise Evaporation Method" by S. Kasiviswanathan, A. K. Kar, B. K. Mathur, K. Srinivasa Raghavan and G. Rangarajan. *Materials Research Bulletin*, **32**(6), pp.737-742, 1997.

3. "Scanning Tunneling Spectroscopy of Indium Tin Oxide Film in Air" by S. Kasiviswanathan, V. Srinivas, A. K. Kar, B. K. Mathur and K. L. Chopra. *Applied Surface Science*, **115**, pp.399-401, 1997.

4. "Scanning Tunneling Microscopic and Spectroscopic Investigation of the Microstructural and Electronic Properties of the Grain Boundaries of Giant Magnetoresistive Manganites" by A. K. Kar, A. Dhar, S. K. Ray, B. K. Mathur, D. Bhattacharya and K. L. Chopra. *J. Phys.: Condens. Matter*, **10**, pp.10795-10804, 1998.

5. "Scanning tunneling microscopy and spectroscopy of $La_{0.67}Ca_{0.33}MnO_3$ thin films grown on $LaAlO_3$(100)" by A. K. Kar, A. Dhar, S. K. Ray, B. K. Mathur, D. Bhattacharya, K. L. Chopra. *Mater. Sc. Engg. B* **68**(1) pp.10-15, 1999.

6. "An inexpensive up-gradation of Scanning Tunneling Microscope for Ballistic Electron Emission Microscopy and Spectroscopy" by S. Gangopadhyay, A. K. Kar, S. K. Ray and B. K. Mathur. *Applied Surface Science* **156** (1-4) pp. 183-188, 2000.

7. "A reverse electrochemical floating-layer technique of SPM tip preparation" by A. K. Kar, S. Gangopadhyay and B. K. Mathur. *Meas. Sci. Technol*. **11** pp. 1426-1431, 2000.

8. "Electrical, Optical, and Scanning Tunneling Microscopic Studies on Layer Type $CdIn_2S_{4-x}Se_x$ ($1.75 \leq x \leq 2.75$)" by S. K. Srivastava, M. Pramanik, D. Palit, B. K. Mathur, A. K. Kar, B. K. Samanta Ray, H. Haeuseler and W. Cordes. *Chem. Mater*. **13**, pp. 4342-4347, 2001.

9. "Light Emission from Porphyrin Molecules Induced by a Scanning Tunneling Microscope" by Zhen-Chao Dong, Asit Kar, Zhi-Qiang Zou, Taizo Ohgi, Pavel Dorozhkin, Daisuke Fujita, Shiyoshi

Yokoyama, Toshifumi Terui, Toshiki Yamada, Toshiya Kamikado, Minniu Zhou, Shinro Mashiko and Takayuki Okamoto; *Jap. J. Appl. Phys*. **41**, 7B-1, pp. 4898-4902, 2002.

10. "STM-Induced Photon Emission Spectra from The Cu(100) Surface" by Z. Zou, Z.-C. Dong, A. K. Kar and H. Nejoh; *Surf. Sci*. **512**, pp. L373-L378, 2002.
11. "Tunneling Electron Induced Luminescence from Monolayered Cu-TBP Porphyrin Molecules Adsorbed on Cu(100)" by Z.-C. Dong, A. K. Kar, P. Dorozhkin, K. Amemiya, T. Uchihashi, S. Yokoyama, T. Kamikado, S. Mashiko and T. Okamoto; *Thin Solid Films* **438-439**, pp. 262-267, 2003.

12. "Improved detection of thermally induced higher resonance modes and harmonics of a microcantilever" by A. K. Kar and M. A. George; *J. Appl. Phys.* **94** (7), pp. 4626-4631, 2003.

13. "Study of Micropipette Assisted Polyethylene-Glycol Coating on Microcantilevers for Sensing Ethanol Vapor" by Y. J. Wright, A. K. Kar, Y. W. Kim, C. Scholz and M. A. George; *Sensors and Actuators B* **107**, pp. 242–251, 2005.

14. "Shape of Field-Induced Nanostructures Formed by STM" by Subhashis Gangopadhyay, Asit Kumar Kar and Balbir Kumar Mathur; *Journal of Nanomaterials* **2007**, 36435 (2007).

15. "Epitaxial multilayered Co/Cu ferromagnetic nanocolumns grown by oblique angle deposition" by A. K. Kar, P. Morrow, X.-T. Tang, T. C. Parker, H. Li, J.-Y. Dai, M. Shima and G.-C. Wang; *Nanotechnology* **18**, 295702 (2007).

16. "Morphology and texture of Cu nanorod films grown by controlling directional flux in physical vapor deposition" by H.-F. Li, A. K. Kar, T. Parker, G.-C. Wang and T.-M. Lu; *Nanotechnology* **19**, 335708 (2008).

17. "Nonlinear Response of Multi-Segmented Photodetectors Used for Measurements of Microcantilever Motion over Large Dynamic Ranges", A. Kar, M. George; *Journal of Sensor Technology* **2**, 196-205 (2012).

18. "Effect of nickel incorporation on microstructural and optical properties of electrodeposited diamond like carbon (DLC) thin films" by B. Pandey, P. P. Pal, S. Bera, S. K. Ray, A. K. Kar; *Appl. Surf. Sci*. **261**, pp. 789-799 (2012).

19. "Measurement of Temperature Induced Unfolding of DNA Hairpins by Microcantilever Sensors", J. D. Ng, J. J. Dowell, A. K. Kar, K. Hansen, T. Thundat, M. A. George; *Open Journal of Applied Biosensor* **2**, 78-82 (2013)

20. "Nickel concentration dependent structural and optical properties of electrodeposited diamond like carbon thin films" by Beauty Pandey, Jonaki Mukherjee, Bidyut Das and Asit K. Kar; *Eur. Phys. J. Appl. Phys.* **66** (1) 10302 p.1-11 (2014).

21. "Structural, optical and electrical properties of electrodeposited cadmium selenide thin films for applications in photodetector and photoelectrochemical cell", by S. Mahato, A. K. Kar; *Journal of Electroanalytical Chemistry* **742**, 23–29 (2015).

22. "Electrical and magnetic properties of electrodeposited nickel incorporated diamond-like carbon thin films", by B. Pandey, D. Das, A. K. Kar; *Applied Surface Science* **337**, 195–207 (2015).

23. "Annealing temperature dependent structural and optical properties of electrodeposited CdSe thin films" by S. Mahato, Nanda Shakti, A. K. Kar; *Materials Science in Semiconductor Processing* **39,** 742–747 (2015).

24. "Structural study of TiO_2 hierarchical microflowers grown by aerosol assisted MOCVD", by Sayari Biswas, Carmen Jimenez, Afzal Khan, Sebastien Forissier, Asit Kumar Kar, David Muñoz-Rojas, Jean-Luc Deschanvres; *Cryst. Eng. Comm*. **19** (11), 1535-1544 (2017).

25. "The effect of annealing on structural, optical and photosensitive properties of electrodeposited cadmium selenide thin films", Somnath Mahato, Asit Kumar Kar; *Journal of Science: Advanced Materials and Devices* **2**, 165-171 (2017).

26. "Optical properties of dip coated titanium-di-oxide (TiO_2) thin films annealed at different temperatures", Sayari Biswas and Asit Kumar Kar; *Mater. Res. Express* **5**, 024006 (pp.1-6), (2018).

27. "Influence of polaron doping and concentration dependent FRET on luminescence of PAni–PMMA blends for application in PLEDs", Dhritiman Banerjee and Asit Kumar Kar; *Phys. Chem. Chem. Phys*. **20** (35), 23055-23071 (2018).

28. "Effect of hydroxide ion concentration on the evolution of nanostructures and structure correlated luminescence of ZnO nanopowders", Dhritiman Banerjee and Asit Kumar Kar; *Optical Materials* **89**, 430 – 440 (2019).

29. "Metal concentration dependent mechanical properties of electrodeposited nickel incorporated diamond like carbon (Ni-DLC) thin films studied by nanoindentation", Suman Sahay, Mukesh Kumar Pandey, Asit Kumar Kar; *Applied Surface Science* **489**, 73–79 (2019).

30. "Synergic effect of polyaniline and ZnO to enhance the photocatalytic activity of their nanocomposite", Keya Sahu , Kazi Hasibur Rahamn and Asit Kumar Kar; *Mater. Res. Express* **6,** 095304 (1-11) (2019).

31. "Effect of precursor concentration of microstructured titanium-dioxide (TiO2) thin films and their photocatalytic activity", Kazi Hasibur Rahman and Asit Kumar Kar; *Mater. Res. Express* **6,** 096436 (1-16) (2019).

32. "Magnetoimpedance study of nickel incorporated diamond like carbon thin films", Mukesh Kumar Pandey, M. Malaidurai, Rajalingam Thangavel and Asit Kumar Kar; *Materials Research Express* **6**, 096115 (1-6) (2019).

33. "Morphology evolution and luminescence enhancement in hydrothermally synthesized Ag doped ZnO nanorods", Lakshmi Kumari and Asit Kumar Kar; *Mater. Res. Express* **6**, 0950b1 (1-10) (2019).

34. "Enhanced photoluminescence through Forster resonance energy transfer in Polypyrrole-PMMA blends for application in optoelectronic devices", Smita Dey, Asit Kumar Kar; *Materials Science in Semiconductor Processing* **103** 104644 (1-6) (2019).

35. "Morphological, optical, photocatalytic and electrochemical properties of hydrothermally grown ZnO nanoflowers with variation in hydrothermal temperature", Keya Sahu, Asit Kumar Kar; *Materials Science in Semiconductor Processing* **104**, 104648 (1-11) (2019).

36. "Titanium-di-oxide (TiO_2) concentration-dependent optical and morphological properties of PAni-TiO2 nanocomposite", Kazi Hasibur Rahman, Asit Kumar Kar; *Materials Science in Semiconductor Processing* **105**, 104745 (1-11) 2020.

37. "Compositional variation dependent colour tuning and observation of Fo¨rster resonant energy transfer in $Cd_{(1-x)}Zn_xS$ nanomaterials", Lakshmi Kumari and Asit Kumar Kar; *New J. Chem*. **44**, 870-883 (2020).
38. "Nickel concentration dependent evolution of magnetic domain structures in electrodeposited carbon composite thin films", Mukesh Kumar Pandey and Asit Kumar Kar, *Journal of Magnetism and Magnetic Materials*, **506**, 166801 (1-7), (2020).

39. "Effect of band gap variation and sensitization process of polyaniline (PANI)-TiO2 p-n heterojunction photocatalysts on the enhancement of photocatalytic degradation of toxic methylene blue with UV irradiation", Kazi Hasibur Rahman, Asit Kumar Kar; *Journal of Environmental Chemical Engineering* **8,** 104181 (1-18) (2020).

40. "Oxygen-Vacancy-Dependent Photocatalysis for the Degradation of MB Dye Using UV Light and Observation of Förster Resonance Energy Transfer (FRET) in PANI-Capped ZnO", Sathi Chatterjee and Asit Kumar Kar; *J. Phys. Chem. C* **124** (33), 18284–18301 (2020).

41. "Excitonic enhancement of colour emission and Förster resonance energy transfer in chemically synthesized Mn-doped ZnS nanomaterials", Lakshmi Kumari and Asit Kumar Kar; *Dalton Trans*. **49**, 16979–16992 (2020).

42. "Influence of oxygen-related surface adsorbates on the growth of low dimensional nanostructures and enhanced luminescence due to superoxide charge-transfer states in ZnO for application in optoelectronic devices", Dhritiman Banerjee and Asit Kumar Kar; *J. Alloy Compd*. **859**, 157793 (1-20) (2021).

43. "Effect of acceptor concentration in the FRET controlled photoluminescence of PMMA-ZnO nanocomposite for the application of PLED device", Smita Dey, Asit Kumar Kar; *Optics & Laser Technology* **136,** 106811 (1-9) (2021).

44. "Photophysics behind luminescence phenomenon in conducting conjugate polymer blends for application as an emissive layer in PLEDs", Dhritiman Banerjee, and Asit Kumar Kar; *J. Appl. Phys.* **129**, 013102 (1-18) (2021).

45. "Composition and excitation wavelength dependent photoluminescence color tuning in nanocomposite of PMMA and ZnO nanorods for PLED", Smita Dey, Asit Kumar Kar; *Journal of Alloys and Compounds* **879**, 160450 (1-12) (2021).

46. "Effect of annealing temperature on the magnetic domain structure and surface mechanical properties of Ni-C composite thin films: Magnetic and lateral force microscopy, and force-distance spectroscopy", Mukesh Kumar Pandey, Asit Kumar Kar; *Materials Letters* **301**, 130295 (1-4) (2021).

47. "Counterion-Induced Tailoring of Energy Transfer in Hydrothermally Grown Nanostructured ZnO for Photocatalysis", Keya Sahu and Asit Kumar Kar; *Cryst. Growth Des*. **21** (7), 3656–3667 (2021).

48. "Role of precursor dependent nanostructures of ZnO on its optical and photocatalytic activity and influence of FRET between ZnO and methylene blue dye on photocatalysis", Smita Dey, Souvik Das, Asit Kumar Kar; *Materials Chemistry and Physics* **270**, 124872 (1-10) (2021).

49. "Role of PVA Capping on Photophysical Properties of Chemically Prepared CdS Nanomaterials: Insights on Energy Transfer Mechanisms in the Capped System", Lakshmi Kumari, Asit Kumar Kar; *Materials Letters* **302**, 130398 (1-4) (2021).

50. "Dependency of morphological and optical properties of electropolymerized PAni thin films on different substrate for supercapacitor applications", Keya Sahu, Asit Kumar Kar; *Materials Letters* **302**, 130450 (1-4) (2021).

51. "Role of acceptor concentration-dependent FRET behind luminescence tuning in polymer capped ZnO for application in hybrid LEDs", Dhritiman Banerjee, Asit Kumar Kar; *Materials Letters* **303**, 130468 (1-4) (2021).

52. "Effect of Forster resonance energy transfer on the photoluminescence of PPy-ZnO composite", Smita Dey and Asit Kumar Kar; *J. Sol-Gel Sci. Technol*. **102**, 679–687 (2022).

53. "Oxygen Vacancy and Adsorbed Superoxides Dependent Photocatalytic Activity of TiO_2 Quantum Dot Thin Films for Degradation of Methylene Blue with Variation of Precursor Concentration", Kazi Hasibur Rahmanz and Asit Kumar Kar; *ECS J. Solid State Sci. Technol*. **10** (8), 081011 (pp.15) (2021).

54. "Precursor concentration induced nanostructural evolution of electrodeposited ZnO thin films and its effect on their optical and photocatalytic properties", Sathi Chatterjee and Asit Kumar Kar; *J. Mater. Sci: Mater. Electron*. **33**, 8970–8986 (2022).

55. "Effect of PPy concentration on the photoluminescence of PPy–PMMA blends: observation of acceptor concentration-dependent FRET", Smita Dey and Asit Kumar Kar; *J. Mater. Sci: Mater. Electron*., **33**, 9018–9030 (2022).

56. "Influence of catalyst loading on photocatalytic degradation efficiency of CTAB assisted TiO_2 photocatalyst towards Methylene blue dye solution", Kazi Hasibur Rahman and Asit Kumar Kar; *Bull. Mater. Sci*. **45**, 18 (1-10) (2022)

57. "Solvent-dependent tuning of blue–green emission of chemically synthesized ZnO nanomaterials with high colour purity and electroluminescence efficiency", Lakshmi Kumari and Asit Kumar Kar; *J. Mater. Sci: Mater. Electron.*, **33**, 9101–9115 (2022).

58. "Role of bridging oxygen vacancy on reduced anatase TiO2 (101) for photodegradation of Rhodamine-B", Kazi Hasibur Rahman and Asit Kumar Kar; *ECS J. Solid State Sci. Technol*. **10**, 116004 (1-17) (2021)

59. "Insights on the impact of photophysical processes and defect states evolution on the emission properties of surface-modified ZnO nanoplates for application in photocatalysis and hybrid LEDs", Dhritiman Banerjee, Payal Banerjee, Asit Kar; *Phys. Chem. Chem. Phys.* **24**, 2424-2440 (2022).

60. "Hydroxylation induced defect states and formation of bidentate acetate adstructure of TiO_2 catalysts with acetic acid variation for catalytic application", Kazi Hasibur Rahman, Asit Kumar Kar; *Semicond. Sci. Technol*. **37** (4), 045008 (2022).

61. "Effect of Al^{3+} doping on the electropolymerized polyaniline (PAni) thin films for supercapacitor application", Keya Sahu, Asit Kumar Kar; *J. Mater. Sci: Mater. Electron*. **33**, 9679–9689 (2022).

62. "Photocatalytic Performance of Hydrothermal Temperature Dependent Dip Coated TiO_2 Thin Films", Sayari Biswas, Asit Kumar Kar; *J. Sol-Gel Sci. Technol*. **102**, 649–664 (2022).

63. "Synergistic influence of FRET, bulk recombination centers, and charge separation in enhancing visible-light-driven photocatalytic activity of Cu^{2+} ion doped ZnO nanoflowers", Sathi Chatterjee, Asit Kumar Kar; *Phys. Chem. Chem. Phys*. **24**, 16281-16299 (2022).

64. "Altering the Photoluminescence Emission Quenching and Energy transfer for the Photocatalytic behaviour of ZnO Nanostructures", Keya Sahu, Asif Ali, Asit Kumar Kar; *ECS Journal of Solid State Science and Technology*, **11,** 086003 (pp.11) (2022)

65. "Oxidation induced catalytic performance of heterostructured Ni-TiO2 nanoparticles and formation of Leuco-Methylene blue", Kazi Hasibur Rahman, Asit Kumar Kar; *Research on Chemical Intermediates*, **48**, 4475 – 4501 (2022)

Articles in Conference /Workshop Proceedings

1. “Studies of Electrodeposited Nickel Incorporated DLC Thin Films” by B. Pandey, P. P. Pal, J. Mukherjee, B. Das and A. K. Kar; *Proceedings of National Seminar on Photonics and Materials*, (NASPAM-2010), pp. 124-131; Department of Applied Physics, Indian School of Mines, Dhanbad.

2. “Microstructural and optical properties of electrodeposited nickel incorporated diamond-like carbon (Ni-DLC) thin films”, B. Pandey, P. P. Pal, J. Mukherjee, B. Das, A. K. Kar; *Nanostructured Materials for Electronics, Energy and Environmental Application* (NANO-2010), pp. 249-254; Editors: V. Rajendran, B. Hillebrands, K. Thyagarajah, K. E. Geckeler; Macmillan Publishers India Ltd., 2010.

3. “Studies of the electrical properties of nickel-DLC thin films”, B. Pandey and A. K. Kar; *Proceedings of National Seminar on Nanomaterials and Their Applications* (NANOMAT-2011); pp. 136–140; Editors: J. Manam, S. K. Sharma, A. K. Kar; Allied Publishers Pvt. Ltd., New Delhi, 2011.

4. "Supramolecular Photonics: An approach by Photon Scanning Tunneling Spectroscopy", A. K. Kar; *Proceedings of National Conference on Advances in Lasers and Spectroscopy* (ALS-2012), pp 6-11; Editors: Vineet Kumar Rai, Pankaj Mishra, Kaushal Kumar; Allied Publishers Pvt. Ltd., New Delhi, 2012.

5. "Electrodeposited Cadmium Selenide thin films for photoelectrochemical cell", S. Mahato and A.K. Kar; *Proceedings of National Conference on Advances in Lasers and Spectroscopy* (ALS-2012), pp 61–64; Editors: Vineet Kumar Rai, Pankaj Mishra, Kaushal Kumar; Allied Publishers Pvt. Ltd., New Delhi, 2012.

6. 'Scanning Tunnelling Microscopy (STM) and Spectroscopy (STS): Fundamentals and Applications', Asit Kumar Kar; "*Proceedings of the National Short Term Course on Modern Methods in Materials Processing and Characterization* (M3PAC-2013)", pp.14–15; September 17-21, 2013; Physics Department, National Institute of Technology Durgapur, West Bengal.

7. "Zinc oxide nanoflower prepared by wet colloid chemical method", S. Mahato, S. Das, and A. K. Kar; *AIP Conference Proceedings* **1591**, 453 (2014); (DAE-SSPS 2013).

8. “Tuning the Optical Properties of ZnO Nanorods by Variation of Precursor Concentration through Hydrothermal Method”, Lakshmi Kumari and Asit Kumar Kar; AIP Conference Proceedings 1953, 030158 (08 May 2018); (ICC-2017)

9. "Optical properties of titanium di-oxide thin films prepared by dip coating method", Biswas, S., Rahman, K. H., & Kar, A. K.; AIP Conference Proceedings 1953 (1), 030004 (08 May 2018); (ICRCS-17).

10. "Optical properties of titanium-di-oxide (TiO_2) prepared by hydrothermal method", Rahman, K. H., Biswas, S., & Kar, A. K.; AIP Conference Proceedings 1953 (1), 030022 (08 May 2018); (ICRCS-17).

11. "Structural and optical properties of ex-situ polymerized PAni-TiO2 nanocomposite", Kazi Hasibur Rahman and Asit Kumar Kar; *Materials Today: Proceedings* **18**, 1067–1071 (2019) (ICN:3I-2017).

12. “Morphological and Optical properties of polypyrrole nanoparticles synthesized by variation of monomer to oxidant ratio”, S. Dey and A. K. Kar; *Materials Today: Proceedings* **18**, 1072–1076 (2019); (ICN:3I-2017).

13. "Effect of oxidizing agent on the structural, optical and photocatalytic activity of hydrothermally synthesized nanostructure polyaniline", Keya Sahu, and Asit Kumar Kar; *AIP Conference Proceedings* **2220**, 080030 (1-6) (05 May 2020); (ICC 2019).

14. "Morphological and optical properties of pure and Cu doped ZnO and their photocatalytic activity on MO dye using visible light", Sathi Chatterjee, and Asit Kumar Kar; *AIP Conference Proceedings* **2220**, 020031 (1-6) (05 May 2020); (ICC 2019)

15. “The effect of monomer concentration in cationic surfactant assisted synthesis of polyaniline (PANI) and its application in visible light irradiated degradation of methylene blue”, Kazi Hasibur Rahman, and A. K. Kar; *AIP Conference Proceedings* **2220**, 020041 (1-5) (05 May 2020); (ICC 2019)

16. “Effect of CTAB concentration on the structural, optical and electrical properties of oxidatively polymerized polypyrrole”, Smita Dey, and Asit Kumar Kar; *AIP Conference Proceedings* **2220**, 020043 (05 May 2020); (ICC 2019)

17. "Molar Concentration Dependent Structural, Morphological and Optical Properties of Polyaniline-Zinc Oxide (PAni-ZnO) Nanocomposite", Keya Sahu and Asit Kumar Kar; *AIP Conf. Proc*. **2352**, 040013 (1 – 5) (05 Aug 2021); (AMRP-2020).

18. "Annealing time and temperature dependent morphological and optical properties of dip coated TiO_2 thin films", Sayari Biswas, and Asit Kumar Kar; *AIP Conference Proceedings* **2369**, 020157 (1 – 6) (13 September 2021); (NCPCM2020).

Invited Lectures

1. “Scanning Tunneling Microscopy and Spectroscopy of Giant Magnetoresistive Manganites”, April, 2000; *Super-Molecular Photonics Joint Research Laboratory, National Research Institute for Metals*, Cooperative Research Center for Advanced Technology, Shimo-Shidami, Moriyama-ku, Nagoya, Japan.

2. “Microcantilever Response Generated from Thermally Induced Transitions of Large DNA Hairpins”, Joseph D. Ng, Jeffrey J. Dowell, **Asit K. Kar,** Karolyn Hansen, Thomas Thundat and Michael A. George; *Microcantilever Sensors, 208th Meeting of the Electrochemical Society*, October 16-21, 2005; Los Angeles, California, USA.

3. ”Tunneling electron induced luminescence from supermolecular harmonic structures”, December 13, 2005; *Department of Physics, Applied Physics and Astronomy, Rensselaer Polytechnic Institute*, Troy, New York, USA.

4. "Tunneling Electron Induced Luminescence from Supermolecular Harmonic Structures of Monolayer Coverage", February 17, 2006; *Condensed Matter Seminar, Department of Physics and Astronomy, The University of Oklahoma*, Norman, Oklahoma, USA.
5. "Epitaxial multilayered Co/Cu nanocolumns grown by oblique angle deposition", March 28, 2007; *Department of Materials Science and Engineering, Rensselaer Polytechnic Institute*, Troy, New York, USA.

6. Nanoscale assembly by oblique angle deposition; September 11, 2007; *Condensed Matter Physics Division, Saha Institute of Nuclear Physics*, Kolkata, West Bengal.

7. "Assembly of ferromagnetic nanowires by glancing angle deposition", November 14, 2007; *Raja Ramanna Centre for Advanced Technology*, Indore, Madhya Pradesh.

8. GLAD nanowires and microcantilever sensors; December 11, 2007; *Department of Condensed Matter Physics and Material Sciences, Tata Institute of Fundamental Research*, Mumbai, Maharashtra.

9. "Growth and studies of oblique angle deposited giant magnetoresistive multilayer and magnetic nanowires", January 13, 2008; *Sardar Vallabhbhai National Institute of Technology*, Surat, Gujarat.

10. “Molecular harmonic structures”, *National Seminar on Micro/ Nano Manufacturing*, December 6-7, 2008, Cambridge Institute of Technology, Tatisilwai, Ranchi, India.

11. Implications of nanotechnology; February 28, 2009; *National Science Day Celebration*, Department of Applied Physics, Indian School of Mines, Dhanbad, Jharkhand.

12. "Prospects in Physics", *Colloquium*, April 19, 2010; Department of Applied Physics, Indian School of Mines, Dhanbad, Jharkhand.

13. "Supramolecular Photonics: An approach by Photon Scanning Tunneling Spectroscopy", *National Conference on Advances in Lasers and Spectroscopy* (ALS-2012), November 1-3, 2012; Department of Applied Physics, Indian School of Mines, Dhanbad.

14. 'Scanning Tunnelling Microscopy (STM) and Spectroscopy (STS): Fundamentals and Applications', *National Short Term Course on Modern Methods in Materials Processing and Characterization* (M3PAC-2013)", September 17–21, 2013; Physics Department, National Institute of Technology Durgapur, West Bengal.

15. "Laser assisted processing of thin films", Short term course on "*Lasers: Technology and Applications in Engineering*", May 16–20, 2016; Department of Applied Physics, Indian School of Mines, Dhanbad, Jharkhand.

16. "Scanning Probe Microscopy in Nano-Biotechnology", *Refresher Programme in PHYSICS with Special Focus on Nano-Biotechnology*, May 25 – June 14, 2017; Faculty Development Centre, IIT (ISM) Dhanbad, Jharkhand.

17. "Global and national fellowship opportunities during and after Ph.D work", *National Training Programme on Research Methodology*, December 18 – 23, 2017; Faculty Development Centre, IIT (ISM) Dhanbad.

18. "Force-Distance spectroscopic investigation of the mechanical properties of electrodeposited Diamond like Carbon thin films", **Asit Kumar Kar**, Suman Sahay, Mukesh Kumar Pandey; *National Conference on Advances in Spectroscopic Techniques and Materials* (ASTM-2018), 14–16th March, 2018; Department of Applied Physics, IIT (ISM) Dhanbad.

19. "Scanning Probe Microscopy", National Training Programme on "*Advanced Materials Characterization Techniques*"; March 19 – 24, 2018; Department of Applied Physics, Faculty Development Centre, IIT (ISM) Dhanbad, Jharkhand.

20. "Nanostructured Thin Films for Smart Energy Materials and Devices", DST-SERB School for Brain Storming Session on Short-Term Course entitled "*Smart Energy Materials & Devices*" (SEMAD-2019), April 29 – May 03, 2019; Executive Development Centre, Indian Institute of Technology (ISM) Dhanbad, Jharkhand.

21. "Research Opportunities in India and Abroad", *Induction Training / Orientation Programme* (*for College/University/Institute Teachers*); November 15 – December 12, 2019; Faculty Development Centre, Indian Institute of Technology (Indian School of Mines) Dhanbad, Jharkhand.

22. "Metal-oxide based polymer nanocomposites for PLED application", (Online) *National Conference on Emerging trends in Physical Sciences*, Department of Physics, ICFAI University Tripura, 27th September – 01st October, 2021.

Presentations in Conferences / Workshops

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91. "Metal Concentration Dependent Surface Mechanical and Frictional Properties of Electrodeposited Nickel Incorporated Diamond-Like Carbon (Ni-DLC) Thin Films Studied by Force-Distance Spectroscopy and Lateral Force Microscopy", **Suman Sahay**, Asit Kumar Kar; *6th International Conference on Nanoscience and Nanotechnology* (ICONN 2021, Virtual Conference); Department of Physics and Nanotechnology, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu; February 01-03, 2021.

92. "Effect of PPy concentration on the photoluminescence of PPy-PMMA blends: Observation of acceptor concentration dependent FRET", **Smita Dey**, Asit Kumar Kar; *6th International Conference on Nanoscience and Nanotechnology* (ICONN 2021, Virtual Conference); Department of Physics and Nanotechnology, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu; February 01-03, 2021.

93. "Enhanced photoluminescence in polyaniline nanotubes through suppression of singlet excitonpolaron interaction", **Smita Dey**, Dhritiman Banerjee and Asit Kumar Kar; *6th International Conference on Nanoscience and Nanotechnology* (ICONN 2021, Virtual Conference); Department of Physics and Nanotechnology, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu; February 01-03, 2021.

94. "Scan Rate Dependent Morphological and Optical Properties of Electropolymerized PAni Thin Films on Different Substrate for Supercapacitor Applications", **Keya Sahu**, Asit Kumar Kar; *6th International Conference on Nanoscience and Nanotechnology* (ICONN 2021, Virtual Conference); Department of Physics and Nanotechnology, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu; February 01-03, 2021.

Dissertations Supervised

M.Phil. (Applied Physics) Projects

1. **Partha Pratim Pal**, "*Structural Properties of Electrodeposited Nickel Incorporated Diamond Like Carbon Thin Films*", May 2010.

2. **Prasenjeet Dutta**, "*Control of Aspect Ratio of Zinc Oxide Nanorods by Polymer Capping in Wet Colloid Chemical Process*", May 2011.

3. **Sudha Kumari**, "*Synthesis of zinc oxide nanostructures by precipitation method with the variation of pH values*", May 2012.

4. **Gayatri Acharjee**, "*Optical properties of carbon nanocomposite thin films*", May 2013.

5. **Asha Kumari**, "*Magnetic Force Microscopy (MFM) of Electrodeposited Nickel Incorporated Diamond Like Carbon Thin Films*", April 2015.

M.Sc. (Applied Physics / Physics) Projects

1. **Kalyan Chowdhury**, "*Electrodeposition of Metal Nanocrystallites Incorporated in Diamond Like Carbon (DLC) Matrix*", May 2009.

2. **Bidyut Das**, "*FTIR Spectroscopy of Nickel Incorporated Diamond Like Carbon Thin Films Electrodeposited on Indium Tin Oxide*", May 2010.

3. **Jonaki Mukherjee**, "*Optical (UV, Vis) Properties of Electrodeposited Nickel Incorporated DLC/ITO Thin Films*", May 2010.

4. **Papiya Dhara**, "*DLC Coating of 3D Objects by Low Voltage Electrodeposition for Industrial Applications*", May 2011.

5. **Sourav Das**, "*Optical properties of ZnO nanostructures prepared by wet colloid chemical method*", May 2012.

6. **Anupam Jana**, "*Optical properties of electrodeposited cuprous oxide (Cu_2O) thin films*", May 2013.

7. **Minarul Islam Sarkar**, "*Growth condition dependent physical properties of electrodeposited nanostructured zinc oxide thin films*", May 2014.

8. **Sudip Karan**, "*Effects of concentration variation on the physical properties of electrodeposited cadmium selenide thin films*", April 2015.

9. **Santanu Maity**, "*Effect of pH variation on the physical properties of electrodeposited Cu2O thin films*", April 2015.

10. **Smita Dey**, "*Oxidative polymerization of aniline at different monomer to oxidant ratio and PAni-PMMA composite as an alternative emissive layer in PLED*", May 2016.

11. **Anindita Mondal**, "*Oxidative polymerization of polyaniline (PAni) using weak oxidant and PAni-PMMA blend as an alternative emissive layer in PLED*", May 2016.

12. **Neda Shamim**, "*Growth and Studies of Thin Films for Electrochemical Atomic Force Microscopy*", May 2017.

13. **Telesphore Barla**, "*Deposition time and annealing temperature dependent morphological and optical properties of electrodeposited ZnO thin film*", May 2018.

14. **Ankur Chatterjee**, "*Effect of hydrothermal temperature on the morphological and optical properties of TiO_2 thin films*", May 2018.

15. **Souvik Das**, "*Morphology dependent photocatalytic activity of ZnO nanostructures synthesized through hydrothermal method*", April 2019.

16. **Biplab Lohar**, "*Effect of pH on optical and morphological properties of TiO2 nanoparticles and their photocatalytic dye degradation activity*", April 2019.

17. **Asif Ali**, "*A Comparative Study on the Synthesis and Photocatalytic Application of ZnO Nanostructure: Hydrothermal and Sol-Gel Methods*", May 2020.

18. **Pritam Pal**, "*UV-Vis-NIR Optical Property of Electrodeposited Diamond-like Carbon (DLC) Film at Different Annealing Temperature and Simulation of Reflectivity of Anti-reflecting DLC Film with Varying Angle of Incident*", May 2022.

Int. M.Sc. (Applied Physics) Projects

1. **Sudhir Kumar Singh**, "*Optical properties of chemically bath deposited ZnS nanobelts in the polymer matrix*", December 2010.

2. **Sudhir Kumar Singh**, "*Effect of Variation of Polymer Concentration and Bath Temperature on the Optical Properties of Chemical Bath Deposited ZnS Nanocomposite Thin Films*", May 2011.

3. **Aditya Priyant**, "*Variation of Bandgap with nickel concentration in electrodeposited Ni-DLC thin film*", May 2014.

B.Tech. (Engineering Physics) Projects

1. **Karan Kumar**, "*Effect of Nickel Concentration on the Optical Properties of Electrodeposited As-deposited Ni-DLC Thin Films Using UV-Vis-NIR Spectrophotometry*", May 2022.

Reports Supervised

M.Sc. (Applied Physics / Physics) Projects

1. **Minarul Islam Sarkar**, "*Temperature controlled electrodeposition of nanostructured ZnO thin films*", Dec 2013.

2. **Sudip Karan**, "*Effects of concentration variation on the physical properties of electrodeposited cadmium selenide thin films*", Nov 2014.

3. **Santanu Maity**, "*Effect of pH variation on the physical properties of electrodeposited Cu_2O thin films*", Nov 2014.

4. **Smita Dey**, "*Oxidative polymerization of aniline: Formation of supramolecular structure with different oxidant to monomer ratio*", Nov 2015.

5. **Anindita Mondal**, "*Oxidative polymerization of aniline: Formation of supramolecular structure with weak oxidant*", Nov 2015.

6. **Neda Shamim**, "*Studies and growth of thin films by Electrochemical Atomic Force Microscopy (EC-AFM)*", November 2016.

7. **Telesphore Barla**, "*Conductive Atomic Force Microscopy of ZnO nanostructures*", November 2017.

8. **Ankur Chatterjee**, "*Conductive Atomic Force Microscopy of TiO_2 nanostructures*", November 2017.

9. **Souvik Das**, "*Photocatalytic activity of ZnO nanoparticles prepared through hydrothermal method*", November 2018.

10. **Biplab Lohar**, "*Photocatalytic activity of TiO_2 nanoparticles prepared through ultrasonic method*", November 2018.

11. **Asif Ali**, "*Synthesis and Characterization of TiO_2 nanoparticles and their photocatalytic dye degradation application*", November 2019.

B.Tech. (Engineering Physics) Project

1. **Puram Arun**, "*Effect of morphology of metal doped ZnO on photocatalytic activity*", May 2021.

2. **Jai Singh Divya**, "*Dopant acid dependent electrochemical and photocatalytic properties of electropolymerized PAni thin films using various dopant acid*", May 2021.

3. **Karan Kumar**, "*TiO_2 thin films for photocatalytic applications*", December 2021.

4. **Nabam Soni**, "*Annealing Temperature Dependent Roughness Variation in Electrodeposited Nickel Incorporated Diamond-like Carbon (Ni-DLC) Thin Films*", November 2022.

Summer Training Project

1. **Kalyani Bhoi** (M.Sc., 1st yr, Department of Physics, NIT Rourkela, Orissa), "*Optical spectroscopy (UV-Vis-NIR) of Diamond Like Carbon thin films*", 21/5/10-21/6/10.