Dr. Dipak A. Tonpe

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WORK EXPERIENCE

Assistant Professor [30/10/2021 — 31/07/2023]
Department of Nanotechnology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India.

Courses Taught (M.Sc. Nanotechnology)
NANO 112 - Solid State- I,
NANO 116 Practical- I,
NANO 223 Solid State- II,
NANO 226 Practical- II,
NANO 335 Applications in Nanotechnology-I,
NANO 446 Applications in Nanotechnology-II.

Assistant Professor [07/10/2017 — 31/07/2018]
Department of Nanotechnology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India.

Courses Taught (M.Sc. Nanotechnology)
NANO 116 Practical- I,
NANO 117 Seminar-I Fundamental Topics in Nanotechnology,
NANO 226 Practical- II,
NANO 227 Seminar-II Fundamental Topics in Nanotechnology.

EDUCATION AND TRAINING

Ph.D. (Nanotechnology) [16/06/2018 — 30/05/2022]
Department of Nanotechnology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad,(India)

Ph.D. Title: - ***Growth and Optoelectronic Properties of Organic-Inorganic Nanocomposite for Technological Application***

With an aim to explore the technological applications of Organic-Inorganic nanocomposites, we have synthesized ZnO-PANI and ZnS-PANI nanocomposites and studied the Solar cell and Li-ion battery applications. Polyaniline PANI/Zinc oxide (ZnO) nanorods hybrid solar cell device was fabricated via a simple two-step process. The fabricated heterojunction films were characterized by several characterization techniques to determine the structural, morphological, electrical, optical and for their solar cell characteristics. The results of solar cell measurements showed that the overall light-conversion efficiency of PANI coated pristine ZnO thin film to be ~ 80% higher than for PANI coated annealed ZnO thin film.

Similarly, ZnS-PANI and ZnO-PANI nanocomposite was synthesized for Li-ion battery application. The ZnS-PANI electrode shows an excellent initial discharge capacity of 1182.1mAh/g, a high discharge capacity of 693.5 mAh/g at a current rate of 0.1 C after 500

cycles, good cycling stability, and an excellent rate capability of 673 mAh/g at 2.0 C, when used as anode materials for lithium-ion batteries (LIBs). The ZnO-PANI electrode exhibits a very high initial discharge capacity of 1052 mAh/g, high discharge capacity of 793 mAh/g at a current rate of 0.1 C after 500 cycles, good cycling stability, and excellent rate capability of 728 mAh/g at 2.0 C, when used as anode materials for lithium-ion batteries (LIBs), The excellent electrochemical performances make the nanosized ZnS-PANI and ZnO-PANI nanocomposites as promising candidate for the LIBs.

M. Sc. Nanotechnology [01/08/2014 — 31/08/2016]
Department of Nanotechnology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad,(India)

M.Sc. PROJECT: Synthesis of $CuFeS_2$ films from acidic chemical baths for optoelectronic device application

Copper Iron Sulphide nanoparticles were synthesized using chemical bath deposition technique. These were then ultrasonically intercalated in annealed thin films $CuFeS_2$. The optoelectronic properties of the films were studied and were found to be enhanced.

DIGITAL SKILLS

-Efficient in using software for computer interface devices viz. Gamry interface 1000, CHI600, Keithley 2400
- Efficient in using research software viz. Origin, Endnote, Fullprof, Xpert Highscore.
- Efficient in using Microsoft Office (MS-Word, MS-Powerpoint, MS-Excel, etc)
- Efficient in Programming using C and C++.

INSTRUMENTS HANDLED

• Ultra High Vacuum DC Sputter coating Unit (Hind high Vac)
• Ultra High Vacuum PVD Unit (Hind high Vac)
• Ultraviolet-vis spectrophotometer (Perkin Elmer Lambada 25),
• Powder X-ray diffraction (Brukar D8 Advance)
• Photoluminescence Spectroscopy (Avantes spec with fiber optic)
• Infrared Spectroscopy (Bruker, Germany Model: Vertex 70 spectrometer)
• Brunauer Emmett Teller (BET) Surface Area analyzer (Quantachrome, Autosorb iQ)
• Atomic Force Microscopy (AFM, PSIA, XE-100)
• X-ray photoelectron spectroscopy (ESCA-LAB 250 Xi, Thermo-VG Scientific)
• Scanning Electron Microscopy (MIRA II LMH from TESCAN)
• Transmission Electron Microscopy (TEM) (Familiar with Philip Tecnai 20)
• Thermogravimetry Analysis, (TA Instruments SDT-Q600,)
• Cyclic Voltammetry (CHI 440), (Gamry Interface 1000)
• Keithley Source meter 2400
• Raman Spectroscopy (STR-150 series, Japan)
• Water contact angle analyzer (Indigenous goniometer; Horiba HD CCD)
• Dynamic light scattering (Zetasizer Nano series, Malvern Panalytical)
• Gas Sensing Unit (Home built system)

RESEARCH EXPERIENCE

On-going Projects:

1. Design and Development of organic -inorganic Nanocomposite materials for Supercapacitor application.
2. Synthesis of Carbon Composites for Energy Storage device application.

Completed Projects: Synthesis of Graphene oxide, MnO and GO doped in MnO Nanocomposite. (July 2021-June 2022)

HONOURS AND AWARDS

- **First Prize Oral Presentation in "Recent Trends in Material Science and Nanotechnology"** Anandrao Dhonde also babaji mahavidhyalaya, Kada, tq. Ashti, Disr-Beed-417208
- **Third Prize Poster Display competition in "National Science Day Celebration 27-28 February 2016".** Dr. Babasaheb Ambedkar Marathwada University, Aurangabad [28/02/2016]

CONFERENCES AND SEMINARS

1. **"International Conference on New Horizons in Materials Science and Nanotechnology (ICNHMSN-2022)"**
   [Yashwantrao Chavan College of Arts, Commerce & Science Sollod, Dist- Aurangabad, 24/06/2022-25/06/2022]
2. **"International Symposium on Nanotechnology for Helthcare: Clinical and Industrial Perspectives 2022"**
   [Nuffield Department of Women's & REPRODUCTIVE Health, Medical Sciences Division, University Of Oxford (UK) 10/06/2022 – 10/06/2022]
3. **"National Conference on Physics and Chemistry of Materials (NCPCM-2020)"**
   [Department of Physics. Government Holkar Science College, Indore, 14/12/2020 – 16/12/2020]
4. **"One Day Webinar on Raman Spectroscopy-Renishaw"**
   [Institute of Chemical Technology Mumbai Marathwada Campus Jalana, Maharashtra, India, 20/12/2021 – 20/12/21]
5. **"International Conference on Ion Beams in Materials Engineering and Characterization (IBMEC-2020)"**
   [IUAC, New Delhi, 08/12/2020 – 11/12/2020]
6. **"International Virtual School on ion Beams in Materials Science" (IBMS-2020)**
   [IUAC, New Delhi, 01/12/2020 – 05/12/2020]
7. **"Advanced functional nanomaterials and Their Device Applications"**
   [Department of Physics and IQAC, 10/08/2020 – 10/08/2020]
8. **"Next generation Semiconductor Devices: Modeling and Simulation"**
   [Department of Electronics and Communication Engineering, KLEF, Vaddeswaram, Guntur, A.P, 04/08/2020 —08/08/2020]
9. **"National E-Conference on Recent Advances in Materials Science & Nanotechnology (NCRAMSN-2020)"**
   [Department of Physics, Yashwantrao Chavan College of Arts, Commerce & Science, Sillod, Dist- Aurangabad (M.S) India, 0108/2020 – 02/08/2020]
10. **National Conference on "Recent Trends in Material Science & Nanotechnology (RTMNS)"**
    [Anandrao Dhonde also babaji mahavidhyalaya, Kada, tq. Ashti, Disr-Beed;17/03/2019 – 17/03/2019]
11. **"National Conference on Functional Materials Synthesis and Characterization Technique(NCFMST-2019)"**
    [Department of Physics Vaidynath College, Parali-Vaijnath, Maharashtra, India, 02/03/2019 – 02/03/2019]
12. **"Materials & Technologies for Energy Conversion and Storage (M-TECS 2018)"**
    [Bhabha Atomic Research Center, Mumbai, 26/09/2018 – 29/09/2018]

13. **"Magnetism" (Workshops)**
    [UGC-DAE CSR, Indore, 27/08/2018 – 31/08/2018]
14. **National Conference on "Advanced Material & Devices for Futuristic Applications" (AMDFA 2018)**
    [Department of Physics, University Institute of Sciences, Chandigarh University, Gharuan; 19/05/2018-20/05/2018]
15. **"DAE-BRNS 4th National Workshop on Material Chemistry-NWMC-2017 (ENBIO-MAT)"**
    [UM-DAE Center for Excellence in Basic Sciences, Mumbai, 15/12/2017 – 16/12/2017]
16. **"UGC-SAP National Seminar on Material Science, X-ray and Gamma Ray Spectroscopies"**
    [Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S) 29/03/2017 – 30/03/2017]
17. **"International Conference on Functional Material and Microwaves (ICFMM-2015)"**
    [Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S) 28/12/2015 – 30/12/2015]
18. **"International Conference On Condensed matter & Applied Physics- (ICC-2015)"**
    [Department of Physics, Govt. College Bikaner, 30/10/2015 – 31/10/2015]
19. **"National Science Day – 2016"**
    [Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S) 27/02/2016 – 28/02/2016]
20. **"National Science Day – 2015"**
    [Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S) 27/02/2015 – 28/02/2015]
21. **"National Seminar on- Role of Green Chemistry in Environmental Pollution (ROGCIEP)"**
    [Department of Chemistry, Anandrao Dhonde Alias Babaji Arts, Commerce & Science College, kada. Tal. Ashti, Dist-Beed, 21/12/2012 – 22/12/2012]

PUBLICATIONS

Published in international/national journal and Conferences:

1) **Dipak A. Tonpe**, Ketan P. Gattu, Vishnu V. Kutwade, Sung-Hwan Han, Bhaskar R. Sathe, Ramphal Sharma ***"ZnO-PANI Nanocomposite: Enhanced Electrochemical Performance towards Energy Storage."*** Journal of Energy Storage, 01 January 2024;
2) **Dipak A. Tonpe,** Ketan P. Gattu, Vishnu V. Kutwade, Makrand E. Sonawane, Mahesh C Sharma, Hyungil Jang, Sung-Hwan Han, Ramphal Sharma, "***ZnS-PANI Nanocomposite with Enhanced Electrochemical Performances for Lithium-Ion Batteries".*** Journal of Materials Science: Materials in Electronics, 30 June 2022; (https://doi.org/10.1007/s10854-022-08698-5)
3) **Dipak A Tonpe**, Ketan P Gattu, Vishnu V Kutwade, Makrand E Sonawane, Avinash S Dive, Ramphal Sharma***"Development of organic/inorganic PANI/ZnO 1D nanostructured hybrid thin film solar cell by soft chemical route",*** Journal of Materials Science: Materials in Electronics (Aug 2019) (https://doi.org/10.1007/s10854-019-01976-9).
4) **Dipak Tonpe**, Ketan Gattu, Vishnu Kutwade, Makrand Sonawane, and Ramphal Sharma; ***"Growth and Optoelectronic Properties of CuFeS2 Thin Film and Effect of Annealing Temperature"*** – (AIP) *National Conference on Physics and Chemistry of Materials* (NCPCM-2020), Department of Physics, Govt. Holkar Science College, Indore (MP, India) during 14-16th December 2020.
5) **Dipak A. Tonpe**, Ketan P. Gattu, Vishnu V. Kutwade, Makrand E. Sonawane, Avinash S.

Dive,Ramphal Sharma*- ***"Growth and Annealing Effect of ZnO Nanorods Thin Film for Solar Cell Applications"*** RESEARCH JOURNEYI International Multidisciplinary E-Research Journal.

6) **Dipak Tonpe**, Ketan Gattu, Ganesh More, Deepak Upadhye, Sandip Mahajan, Ramphal Sharma- "**Synthesis of $CuFeS_2$ thin films from acidic chemical baths"** (2016); **(**http://dx.doi.org/10.1063/1.4946727**)**
7) Sumaiyya Shaikh, Vishnu V Kutwade, Ketan P Gattu, Faizan Khan, Prakash Gajbar, Makrand Sonawane, **Dipak A Tonpe**, Mahesh Sharma, Deepak Singh Rajawat, Ramphal Sharma- "***Formulation of microwave assisted Z-scheme MoS2@TiO2: explored physicochemical properties and photodegradation of MO dye"*** Journal of Dispersion Science and Technology (Dec 2023) (https://doi.org/10.1080/01932691.2023.2298871)
8) Madhuri Patil, Hyungil Jang, Sung-Hwan Han, Ketan P Gattu, **Dipak A Tonpe**, Vishnu V Kutwade, Ramphal Sharma; **"*Electrochemical performance of low-cost PANI-anchored CuS electrode for lithium-ion batteries",*** Journal Applied Physics A (Feb 2023) (https://doi.org/10.1007/s00339-023-06417-3)
9) Vishnu Kutwade, Ketan Gattu, **Dipak Tonpe**, Makrand Sonawane, Manoj Mishra, and Ramphal Sharma – ***"T heoretical modelling and optimization: Cd-free CTS/Zn(O,S)/ZnO thin film solar cell"***; Material Today Communications, (Nov 2021) (https://doi.org/10.1016/j.mtcomm.2021.102972).
10) Vishnu Kutwade, Ketan Gattu, **Dipak Tonpe**, Makrand Sonawane, Manoj Mishra, and Ramphal Sharma – ***"Contribution in PCE enhancement: numerical designing and optimization of SnS thin film solar cell"***; Journal of Nanoparticle Research (July 2021) (https://doi.org/10.1007/s11051-021-05259-5).
11) Vishnu V Kutwade, Ketan P Gattu, Avinash S Dive, Makrand E Sonawane, **Dipak A Tonpe**, Ramphal Sharma;***"Enhanced photosensing by Mg-doped ZnO hexagonal rods via a feasible chemical route",*** Journal ofMaterials Science: Materials in Electronics, (Feb 2021) (https://doi.org/10.1007/s10854-021-05364-0).
12) Vishnu V. Kutwade[1], Ketan P. Gattu[2], Makrand E. Sonawane[1], Faizan Khan[1], **Dipak A. Tonpe[2]**, Mohammad Balal[3], Sudipta Roy Barman[3], Ramphal Sharma[1,2,4]; ***"Growth and exploration of visible-light-driven enhanced photocatalytic activity of $Cu_{1-x}Cr_xS$/CdS heterojunction thin flm for active dye degradation",*** Applied Physics A (2022) (https://doi.org/10.1007/s00339-022-05757-w)
13) Vishnu Kutwade, Ketan Gattu, Makrand Sonawane, **Dipak Tonpe** and Ramphal Sharma; ***"Optoelectronic properties of sonochemical synthesized of CTS nanoparticles for thin-film solar cell application"*** - International Web Conference on Advanced Material Science & Nanotechnology (NANOMAT-2020), Department of Physics, Vinayak Vidnyan Mahavidyalaya, Nandgaon Khandeshwar, Dist. Amravati, Maharashtra, India during 20-21 June 2020.

REFERENCES

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