Murshidabad University

FACULTY ACADEMIC PROFILE/ CV

Full name of the faculty member: Dr. Debi Prasad Datta

Designation: Assistant Professor

Contact information: 96/3 Bishnupur Road, Manoroma Abasan, Flat 5A, Berhampore 742101

Academic qualifications:

College/University from which the degree was obtained	Abbreviation of the degree
Visva Bharati	B.Sc.
Visva Bharati	M.Sc.
Saha Institute of Nuclear Physics, Kolkata	Ph.D.

Positions held/ holding: Assistant Professor

Research interests:

My research interest is understanding the self-organized evolution of nanostructures under ion irradiation and the modification in material properties resulting from nanoscale structural and compositional variation. The novel properties of materials at nanoscale are becoming increasingly important with the expanding scope of nanotechnology. Consequently, large scale synthesis of nanostructures or nanopatterns in a reliable, reproducible, and controllable way is becoming vital towards tailoring the material properties. In this context, ion beam synthesis offers the special advantage of large scale fabrication, often in a single step, which is controllable in terms of a number of experimental parameters. A range of nanostructures including periodic nanoscale surface patterns like ripples/nanodots, nanoscale porous structures, and metal/metal-semiconductor composite nanodots evolves on materials surface under ion irradiation of bulk substrates and thin films under specific experimental condition.

It is of great scientific interest to understand the process of evolution of such varied range of nanostructures and correlation of material properties with structural and compositional modification. This is also crucial towards designing of nanostructured materials with tailor made properties for technological applications.

- **Self-organized evolution of periodic surface nanostructures under ion irradiation**
- **Evolution of nano-porous materials under ion irradiation**
- **Metal-semiconductor composite nanostructure evolution by ion beam dewetting**
- **Understanding the properties of nanostructured materials**

Research guidance:

Projects:

Select list of publications (Only number):

a) Journals: 36
b) Books/ book chapters:
c) Conference/ seminar volumes: 4

Membership of Learned Societies:

Invited lectures delivered: '**Medium energy ion impact on semiconductor and insulator surfaces: evolution of nanostructure and surface properties**' in **International Conference on Nanostructuring by Ion Beams (ICNIB 2021)**, 5th to 8th October, 2021 organized by Inter University Accelerator Center, New Delhi, IOP Bhubaneswar, IIT Bhubaneswar, and NISER,Bhubaneswar

Awards: Post-doctoral Fellowship offered by National Institute for Materials Science, Japan.

Other notable activities: Indian patent on "a solar Photocatalytic process for treatment of wastewater" (patent no **442435**) with J. Talukdar and B. Tripathy.

List of Journal Publication: (Last ten years)

Journal

27. D. P. Datta and **T. Som, Strongly antireflective nano-textured Ge surface by ion-beam induced self-organization,** *Solar Energy* **223**, 367 (2021).

26 D. P. Datta, A. Chettah, B. Satpathi and P. K. Sahoo, **Ultraviolet and Infrared luminescent Au-rich nanostructure growth in SiO2 by burrowing and inverse Oswald ripening process**, *Scientific Reports* **09**, 14978 (2019).

25 S. K. Mohanty, H. S. Mohanty, B. Behera, **D. P. Datta**, S. Behera, P. R. Das, **Influence of NaNbO3 on the structural, optical and dielectric properties of 0.05(K0.5Bi0.5TiO3)–0.95(NaNbO3) composites ceramics**, *Journal of Materials Science: Materials in Electronics* **30**, 5833 (2019).

24. Mohit Kumar, **D P Datta**, Tanmoy Basu, S K Garg, H Hofsäss and Tapobrata Som, **Temporal evolution on SiO2 surface under low energy Ar+-ion bombardment: roles of sputtering, mass redistribution, and shadowing**, *Journal of Physics, : Condensed Matter* **30**, 334001, 2018.

23. D. P. Datta, A. Chettah, V. Siva, D. Kanjilal, and P. K. Sahoo, **Dewetting induced Au-Ge composite nanodot evolution in SiO2**, *Applied Surface Science* **428**, 676, 2018.

22. D. P. Datta, V. Siva, A. Singh, D. Kanjilal, and P. K. Sahoo, **Photoluminescent Au-Ge composite nanodots formation on SiO_2 surface by ion induced dewetting,** *Nuclear Instruments and Methods in Physics Research B* **407**, 141 (2017).

21. S.K. Garg, **D.P. Datta**, D. Kanjilal, T. Som, **Aspects of ions induced texture evolution on Ge surface: A statistical assessment,** *Nuclear Instruments and Methods in Physics Research B* **409**, 181 (2017).

20. V.Siva, **D. P. Datta**, S. Ojha, S. Chatterjee, S. Varma, D. Kanjilal, and P. K. Sahoo, **Synthesis of sponge-like hydrophobic $NiBi_3$ surface by 200 keV Ar ion implantation,** *Applied Surface Science* **410**, 519 (2017).

19. A. Singh, K. Senapati, **D. P. Datta**, R. Singh, T. Som, S. Bhunia, D. Kanjilal, P. K. Sahoo, **Synthesis of p-n junctions in ZnO nanorods by O+ ion implantation**, *Nuclear Instruments and Methods in Physics Research B* **409**, 143 (2017).

18. D. P Datta, V. Siva, S. Varma, D. Kanjilal, and P. K. Sahoo, **Ion induced dewetting of Au-Si on SiO_2 surface:composite nanodot evolution and wettability transition,** *Physical Chemistry Chemical Physics* **18**, 29955 (2016).

17. S. K. Garg, **D.P. Datta**, T. Basu, I. Thakur, S.R. Tripathy, K. Khare, D. Kanjilal, T.Som, **Tunable wettability of Si through surface energy engineering by nanopatterning**, *RSC Advances*, **6**, 48550 (2016).

16. D. P. Datta and T. Som, **Nanoporosity-induced superhydrophobicity and large antireflection in InSb**, *Applied Physics Letters* **108**, 191603 (2016).

15. V. Siva, S. S. Sahu, **D. P. Datta**, P. C. Pradhan, M. Nayak, V. Solanki, D. Topwal, K. Senapati, P. K. Sahoo, **Ion irradiation induced phase transition of Co in Co/Au multilayer**, *Journal of Alloys and Compounds*, **680**, 722 (2016).

14. D. P. Datta, S. K. Garg, S. Chatterjee, B. Satpati, P. K. Sahoo, D. Kanjilal and T. Som, **Facile synthesis of a superhydrophobic and colossal broadband antireflective nanoporous GaSb surface,** *RSC Advances*, **6**, 48919 (2016).

13. D. P. Datta, V. Siva, A. Singh, S. R. Joshi, D. Kanjilal, P. K. Sahoo, **Ion-beam-induced nanodots formation from Au/Si thin films on quartz surface** *Nuclear Instruments and Methods in Physics Research B* **379**, 48 (2016).

12. D. P. Datta, S. K. Garg, T. Basu, B. Satpati, H. Hofsäss, D. Kanjilal, and T. Som, **Temporal evolution of Ge surface topography under keV ion irradiation: Combined effects of curvature-dependent sputter erosion and atomic redistribution** *Applied Surface Science* **360**, 131 (2016).

11. Vantari Siva, **D. P. Datta**, A. Singh, T. Som, and P. K. Sahoo, **Nanocomposite synthesis and photoluminescence properties of MeV Au-ion beam modified Ni thin films** *Applied Surface Science* **360**, 276 (2016).

10. S. K. Garg, **D. P Datta**, T. Basu, M Kumar, D. Kanjilal, T. Som, **Statistical analysis of ripple morphology on Si surfaces due to 60 keV Ar+-ions** *Surface Topography: Metrology and Properties* **4**, 015002 (2016).

9. D. P. Datta, S. K. Garg, B. Satpati, P. K. Sahoo, A. Kanjilal, S. Dhara, D. Kanjilal, and T. Som, **60 keV Ar^+-ion induced modification of microstructural, compositional, and vibrational properties of InSb,** *Journal of Applied Physics* **116**, 143502 (2014).

8. S. K. Garg, **D. P. Datta**, J. Ghatak, D. Kanjilal, and T. Som, **Medium energy Ar^+ ion induced ripple formation: Role of ion energy in pattern formation** *Applied Surface Science* **317**, 476 (2014).

7. D. P. Datta, A. Kanjilal, B. Satpati, S. Dhara, T.D. Das, D. Kanjilal, and T. Som, **Argon-ion-induced formation of nanoporous GaSb layer: Microstructure,infrared luminescence and vibrational properties**, *Journal of Applied Physics* **116**, 033514 (2014).

6. D.P. Datta, A. Kanjilal, S.K. Garg, P.K. Sahoo, B. Satpati, D. Kanjilal, T. Som, **Evolution of porous network in GaSb under normally incident 60 keV Ar^+-ion irradiation**, *Applied Surface Science* **310**, 189 (2014).

5. D. P. Datta, A. Kanjilal, S. K. Garg, P. K. Sahoo, D. Kanjilal, and T. Som, **Temporal evolution of nanoporous layer in off-normally ion irradiated GaSb,** *Journal of Applied Physics* **115**, 123515 (2014).

4. S.K. Garg, **D.P. Datta**, M. Kumar, D. Kanjilal, T. Som, **60 keV Ar^+-ion induced pattern formation on Si surface: Roles of sputter erosion and atomic redistribution**, *Applied Surface Science* **310**, 147 (2014)

3. U. B. Singh, D. C. Agarwal, S. A. Khan, S. Mohapatra, H. Amekura, **D. P. Datta**, A. Kumar, R. K. Choudhury, T. K. Chan, T. Osipowicz, and D. K. Avasthi, **Synthesis of embedded Au nanostructures by ion irradiation: influence of ion inducedviscous flow and sputtering,** *Beilstein Journal of Nanotechnology* **5**, 105 (2014).

2. **D.P. Datta**, Y. Takeda, H. Amekura, M. Sasase, N. Kishimoto, **Controlled shape modification of embedded Au nanoparticles by 3 MeV Au^{2+}-ion irradiation**, *Applied Surface Science* **310**, 164 (2014).
1. T. Basu, **D. P. Datta** and T. Som, **Transition from ripples to faceted structures under low energy argon-ion bombardment of silicon: Understanding the role of shadowing and sputtering,** *Nanoscale Research Letters* **8**, 289 (2013).

Conference Proceedings

1. Vantari Siva, **Debi P. Datta**, S. Prusty, and Pratap K. Sahoo, **Solid state reaction induced phase evolution of Ni/Bi thin films** *DAE Solid State Physics Symposium 2016* AIP Conference Proceedings **1832**, 080021 (2017)