Anupam Roy

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Research

Surface Physics and Materials Science, Epitaxial Thin Films and Nanostructures, Layered Materials

Education

Indian Association for the Cultivation of Science, Kolkata, India
Jadavpur University, Kolkata, & **Institute of Physics**, Bhubaneswar — 2011
Ph.D., Dept of Materials Science, IACS

Institute of Physics, Bhubaneswar, India — 2004
Diploma in Advanced Physics (Equivalent to M.Phil. of Utkal University)

Jadavpur University, Kolkata, India — 2003
M.Sc., Physics

University of North Bengal (Malda College), India — 2001
B.Sc., Physics (Hons)

Work Experience

The University of Texas at Austin, Austin, TX, USA — Ongoing from July 2014
Research Associate at Microelectronics Research Center

The University of Texas at Austin, Austin, TX, USA — Feb 2012 to June 2014
Postdoctoral Fellow at Microelectronics Research Center

Indian Association for the Cultivation of Science, Kolkata, India — Dec 2011 to Feb 2012
Research Associate at Dept of Materials Science

Osaka Electro-Communication University, Japan — Jan 2010 to Feb 2010
Visiting fellow for research experiment under DST-JST collaboration

Honors, and Awards

Scholarship for academic performance at Secondary examinations 1996

Ranked 14^{th} in All India Joint Entrance Screening Test Physics (JEST) 2003

Professional Activities

Alumni member of Institute of Physics since 2004

Annual member of American Physical Society since 2013

Referee/Reviewer: *Applied Physics Letters (AIP)*, *Nano Letters (ACS)*, *ACS Applied Materials & Interfaces (ACS)*, *Journal of Alloys and Compounds (Elsevier)*, *Advanced Materials (Wiley)*

Selected Publications

33 publications in peer-reviewed journals (**June 2016)**

A Roy, HCP Movva, B Satpati, K Kim, R Dey, A Rai, T Pramanik, S Guchhait, E Tutuc, SK Banerjee, **Structural and electrical properties of $MoTe_2$ and $MoSe_2$ grown by molecular beam epitaxy**, *ACS Appl. Mater. Interfaces* **8**, *7396-7402 (2016); arXiv:1603.02656*

CC Hsieh, A Roy, A Rai, YF Chang, SK Banerjee, **Characteristics and mechanism study of cerium oxide based random access memories**, *Appl. Phys. Lett.* **106**, *173108 (2015)*

A Roy, S Guchhait, R Dey, T Pramanik, CC Hsieh, A Rai, SK Banerjee, **Perpendicular magnetic anisotropy and spin glass-like behavior in molecular beam epitaxy grown chromium**

telluride thin films, *ACS Nano* **9**, *3772-3779 (2015); arXiv:1509.08140*

T Bagarti, A Roy, K Kundu, BN Dev, **The effect of exclusion on nonlinear reaction diffusion system in inhomogeneous media**, *Physica A* **405**, *52-62 (2014); arXiv:1211.5578*

A Roy, S Guchhait, S Sonde, R Dey, T Pramanik, A Rai, HCP Movva, L Colombo, SK Banerjee, **Two-dimensional weak anti-localization in Bi_2Te_3 thin film grown on Si(111)-(7×7) surface by molecular beam epitaxy**, *Appl. Phys. Lett.* **102**, *163118 (2013)*

T Bagarti, A Roy, K Kundu, BN Dev, **A reaction diffusion model of pattern formation in clustering of adatoms on silicon surfaces**, *AIP Advances* **2**, *042101 (2012)*

A Roy, B Sundaravel, R Batabyal, BN Dev, **Fractal pattern formation in thermal grooving at grain boundaries in Ag films on Si(111) surfaces**, *Thin Solid Films* **520**, *5086-5090 (2012)*

A Roy, JK Dash, A Rath, BN Dev, Epitaxy-like orientation of nanoscale Ag islands grown on air-oxidized Si(110)-(5×1) surfaces, *Surf. Interface Anal.* **44**, *513-518 (2012)*

A Roy, T Bagarti, K Bhattacharjee, K Kundu, BN Dev, **Patterns in Ge cluster growth on clean and oxidized Si(111)-(7×7) surfaces**, *Surface Science* **606**, *777-783 (2012)*

A Roy, K Bhattacharjee, J Ghatak, BN Dev, **Growth of epitaxially oriented Ag nanoislands on air-oxidized Si(111)-(7×7) surfaces: Influence of short range order on the substrate**, *Appl. Surf. Sci.* **258**, *2255-2265 (2012); arXiv:1009.2633*

A Roy, K Bhattacharjee, JK Dash, BN Dev, **Growth of oriented Ag nanocrystals on air-oxidized Si surfaces: An in-situ reflection high energy electron diffraction study**, *Thin Solid Films* **520**, *853-860 (2011)*

A Roy, K Bhattacharjee, BN Dev, **Growth of $(\sqrt{3}\times\sqrt{3})$-Ag and (111) oriented Ag islands on Ge/Si(111) surfaces**, *Appl. Surf. Sci.* **256**, *508-512 (2009)*

A Roy, K Bhattacharjee, HP Lenka, DP Mahapatra, BN Dev, **Ge growth on self-affine fractal Si surfaces: influence of surface roughness**, *J. Phys. D: Appl. Phys.* **42**, *145303 (2009)*

A Roy, K Bhattacharjee, JK Dash, BN Dev, **Growth of oriented crystalline Ag nanoislands on air-exposed Si(001) surfaces**, *Appl. Surf. Sci.* **256**, *361-364 (2009)*

K Bhattacharjee, A Roy, J Ghatak, PV Satyam, BN Dev, **Ultrasmall Ge islands with low diameter-to-height aspect ratio on Si(100)-(2×1) surfaces**, *Appl. Surf. Sci.* **256**, *356-360 (2009)*

A Roy, K Bhattacharjee, HP Lenka, DP Mahapatra, BN Dev, **Surface roughness of ion-bombarded Si(100) surfaces: Roughening and smoothing with the same roughness exponent**, *Nucl. Instr. and Meth. B* **266**, *1276-1281 (2008)*

K Bhattacharjee, A Roy, K Kundu, BN Dev, **Electronic structure of Ag-adsorbed nanowire-like stripes on Si(110)-16×2 surfaces. I. An in-situ STM and STS experiment**, *Phys. Rev. B* **77**, *115430 (2008)*

K Bhattacharjee, A Roy, K Kundu, BN Dev, **Electronic structure of Ag-adsorbed nanowire-like stripes on Si(110)-16×2 surfaces. II. A one-dimensional tight-binding model with Green's function approach**, *Phys. Rev. B* **77**, *115431 (2008)*

Full list at
Google Scolar: https://scholar.google.com/citations?user=8XRGQwwAAAAJ&hl=en&oi=ao
ResearchGate: https://www.researchgate.net/profile/Anupam_Roy3

Selected Conferences And Seminars

Ultrasmall Ge islands with low diameter-to-height aspect ratio on Si(100)-(2×1) surfaces, *International Conference on Advanced Nanomaterials, Indian Institute of Technology Bombay, India* **Jan 2007**

Growth of Ge and Ag nanostructures on reconstructed and modified Si surfaces *Institute of Physics, Bhubaneswar, India* **Sep 2007**

Ge growth on self-affine fractal Si surfaces: Influence of surface roughness *Institute of Physics, Bhubaneswar, India* **July 2008**

Growth of narrow-neck, epitaxial and nearly spherical Ge nanoislands on air-exposed Si(111)-(7×7) surfaces *2nd International Conference on Physics at Surfaces and Interfaces, Puri, India* **Feb 2009**

Defect-mediated patterning of Ge nanoislands on Si(111)-(7×7) surfaces *Condensed Matter Days, Dept of Physics, Jadavpur University, Kolkata, India* **Aug 2009**

Growth of epitaxially oriented Ag on air-exposed Si(100), (110) and (111) surfaces *Indian Association for the Cultivation of Science, Kolkata, India* **May 2010**

Aspects of self-assembled nanostructures grown by molecular beam epitaxy on pristine, ion-beam modified and oxidized silicon surfaces *Jadavpur University, Kolkata, India* **Dec 2011**

Growth of topological insulators on Si(111)-(7×7) surfaces by molecular beam epitaxy *American Physical Society March Meeting, Bultimore, Maryland, USA* **March 2013**

Magnetic and magneto-transport studies of MBE grown Cr_2Te_3 thin films with perpendicular magnetic anisotropy *American Physical Society March Meeting, San Antonio, Texas, USA* **March 2015**

Molecular beam epitaxy growth and characterization of layered chalcogenides *Indian Institute of Science Education and Research, Kolkata, India* **Dec 2015**

Molecular beam epitaxy growth and characterization of layered chalcogenides *Indian Institute of Science Education and Research, Mohali, India* **Jan 2016**

Area of Expertise

My graduate research was in the broad areas of experimental surface physics, and nanoscience. My dissertation focused on the *molecular beam epitaxy* (MBE) growth and characterization of thin films, and self-organized nanostructures on clean as well as on modified silicon surfaces. MBE technique allows to control the growth rate precisely, facilitating a well-ordered thin film or nanostructure growth with a sharp interface and providing better opportunity to 'design' the nanostructures. Modifications to substrates have been accomplished through processes such as ion-bombardment, passivation, strain-control, etc. The growth mechanism was found to alter with each modification, and self-organized nanostructures grown on these modified substrates displayed interesting surface morphologies. Extensive surface characterization was done to investigate the nature of growth on these surfaces. As a postdoctoral fellow, the focus is to conduct scholarly research on nanostructures with an eye on the potential application in spintronics and electronic devices. I am currently working on MBE growth and characterization of *topological insulators*, *transition metal chalcogenides*, and several other magnetic and oxide materials, and their applications in devices and systems.

Research & Skills

My research skills broadly cover:

- Molecular Beam Epitaxy (MBE) of thin films, and self-organized nanostructures.
- *In-situ* surface characterization techniques like scanning tunnelling microscopy (STM), reflection high-energy electron diffraction (RHEED), and X-ray photoelectron spectroscopy (XPS).
- Very familiar with characterization techniques likes X-ray diffraction (XRD), photoemission electron microscopy (PEEM), low-energy electron diffraction (LEED), Raman spectroscopy, etc.
- Extensively involved in transport, and magnetic measurements.

Laboratory Experience

Installation of MBE-Surface Science Laboratory: Worked as a team member during the installation process at the Indian Association for the Cultivation of Science, Kolkata (2007) and at the University of Texas at Austin (2012)

Mentoring and supervising Masters and Graduate students at UT Austin

References

Prof. Bhupendra N Dev
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