CURRICULUM VITAE

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Google Scholar: https://scholar.google.co.in/citations?user=MDsPBvEAAAAJ&hl=en

7. ACADEMIC DETAILS:

2nd January 2020 – present	**Assistant Professor** Department of Physics, Belda College, Affiliated to Vidyasagar University, West Bengal, India.
July 2019 – 31st December 2019	**Post-Doctoral Fellow (Research Professor)** Department of Physics, Yonsei University, South Korea.
June 2018 – June 2019	**PBC Post-Doctoral Fellow** Faculty of Engineering, Bar Ilan University, ISRAEL.
21st June 2016 – **22nd June 2018**	**Institute Post-Doctoral Fellow** Department of Physics, Indian Institute of Technology Kharagpur, INDIA.
23rd March, 2016 – **20th June, 2016**	Research Scientist Institute of Physics (IOP), Bhubaneswar, INDIA.
2011 – 22nd March, 2016 Ph.D. (Experimental Condensed Matter Physics) Thesis supervisor:	Doctor of Philosophy (PhD) Institute of Physics (IOP), Bhubaneswar, INDIA. Prof. P. V. Satyam.

2010 – 2011 Diploma in Advanced Physics:	Pre-doctoral Scholar (M. Phil.) IOP, Bhubaneswar, INDIA.
2006 – 2008 M. Sc. (Physics)	Master of Science (M. Sc.) Indian Institute of Technology Bombay, Mumbai, INDIA.
2003 – 2006 B. Sc. (Physics)	Bachelor of Science (B. Sc.) Vidyasagar University, Medinipore (W), West Bengal, INDIA.

8. AWARDS/SCHOLARSHIPS/FELLOWSHIPS:

- **2006 :** Merit-cum-Means Scholarship from Indian Institute of Technology Bombay, Govt. of India.
- **2008 and 2010 :** *Joint Entrance Screening Test* (JEST) conducted by 24 leading research institutes in India. (http://www.jest.org.in/)
- **2010 :** National Eligibility Test(NET) for Junior Research Fellowship and lectureship conducted by Council of Scientific and Industrial Research, India. (www.csir.res.in/)
- **2008 :** Graduate aptitude test in engineering (GATE).
- **2012 :** Metallographic contest Prize (2nd) in EMSI Conference at IISC Bangalore.
- **2017 :** Planning and Budgeting Committee's (PBC) Postdoctoral Fellowship.
- **2019 :** Best Poster Presentation Award, ICAMD-2019 at Jeju, Korea.

9. TECHNICAL SKILLS:

Experience in Modern Instrumental Techniques:

- Expertise in operating **High resolution Transmission Electron Microscope (JEOL JEM 2010, JEOL JEM 2100 and JEOL JEM 2100 Plus)** with different kinds of ex-situ and in-situ sample holders. For *in-situ work*, I have used GATAN made single tilt holder (Model 628), **Fusion Select** made by **Protochips** and **atmospheric in-situ holder** made by **Protochips**. For my own and several collaborative research I have used GATAN single tilt (EM 21020) and double tilt (EM 31031) holders. I have expertise in preparing ***planar*** as well as ***cross section*** TEM specimens mechanically as well using FIB (lamella).

- I have strong operating experience on Cross-beam system coupling a Carl Zeiss, Neon 40 scanning electron microscope (**SEM** , Gemini Column) and a Canion 31 focused ion beam (**FIB**, Orsay Physics), equipped with gas injection system (**GIS**, Orsay Physics), STEM detector, Four Quadrant Back scattered electron detector (Carl Zeiss) and EDS detector (INCA, Oxford).
- I have expertise on **TEM lamella (X-TEM specimen) preparation using FIB**.

- Expertise on device fabrication using **e-beam lithography technique:** Operated ELPHY Quantum lithography system (Raith) and TESCAN SEM-Lithography System.

- Expertise in **Thin Film deposition**: Using various physical vapour deposition (PVD) systems including pulsed laser deposition (PLD).

- Growth of various nanostructures using Chemical Vapor Deposition Technique (**CVD**) via catalyzed vapor-liquid-solid (VLS) and uncatalyzed vapor-solid (VS) growth mechanism.

- Expertise on low-temperature micro- Raman and polarization resolved Photoluminescence measurements using **LabRAM HR Evolution** – **HORIBA** spectrometer.

- Expertise on four-probe transport property measurement (@ various ambiances) system for optoelectronic device characterizations.

- Familiar with Organic Molecular beam deposition (**OMBD**), X-ray diffraction and various spectroscopy techniques (such as, Photoluminescence, Cathodoluminescence and UV-Vis-NIR).

- **RBS:** I have done accelerator based experiments like Rutherford backscattering spectrometry (RBS) in 3 MeV Pelletron accelerator, for some collaborative work.

Operating Systems: Windows XP, Vista, 7, 8 and Linux (Fedora and Ubuntu).

Programming Languages: FORTRAN, C++, AutoCAD, Mathematica.

Image analysis: ImageJ, Gatan Digital Micrograph (DM3).

Graphics Packages: ORIGIN and XMGRACE.

Documentation: Windows office packages and Latex.

10. Research Summary and Current Interests:

- ✓ My core research interests lie in exploring and understanding growth of inorganic (such as, oxides, group III-V semiconductors and 2D layered materials) as well as organic (Π-conjugated oligomers and polymers) semiconducting wide band gap materials thin films and their low dimensional nano-structures. For me it is of great interest to construct hetero-structures of organic-inorganic as well as noble metal nanoparticles (Au and Ag) entangled semiconductor nanostructures, considering various frontier electronic and optoelectronic applications. Additionally, my research interest also includes fundamental investigations of compound oxide materials and frontier 2D materials properties and multifunctional material integration issues.

- ✓ Being an electron microscopist I am very much interested in studying fundamental processes like structural phase transitions, growth dynamics of nanostructures, liquid solid interactions, oxidation and reduction processes etc. using the strength of ***in-situ Transmission Electron Microscopy***. I have carried out several in-situ annealing experiments inside TEM as a part of my collaborative works **during** my PhD thesis work on metal/Si and Metal/Ge systems. Where, I was also partly involved in studying

the effect of thermal annealing inside TEM, on the ion tracks that are formed as an effect of ion irradiation on TiO_2 and ZnO thin films/Si substrate. At present at Yonsei University I have been involved in studying electron beam and also external thermal/gas stimuli driven different anisotropic etching processes in graphene and black phosphorus. Alongside we are studying metal diffusion on frontier 2D materials like black phosphorus, h-BN, graphene, MoS_2 and their stable heterostructure formation dynamics via strain engineering and so on.

- ✓ Optoelectronic device application (such as a **photodetector**, **solar cell** and **LED**) are always been interesting topic in my research carrier. Multitude disciplines including optical communication, video imaging, biomedical imaging, night vision, motion detection among other divert application domains are facilitating light as the heart of their implementation feasibility. Either by exploiting the advantage the light holds over electrical signals in carrying data or simply by converting the light into electrical signals, the ability to use the light is a fundamental need. Now it is clear more than ever that photodetection play significant role in modern and future technology which affects a prominent portion of our daily lives. Photodetectors, which are the key component of light to electric conversion, are now main focus of my research along with interests in electroluminescent devices where electrical energy will be converted into light. During my Ph.D. intrinsically self-assembled plasmonic noble metal NPs (Au and Ag) conjugated ZnO, MoO_3, MoO_2 and GeO_2 hetero-nanostructures of various dimensionalities and oxygen defect densities were utilized towards efficient photodetection applications. My post Ph.D. research is mostly focused on optoelectronic device fabrications and optimizations; where I have been involved in synthesis as well as tailoring properties of 2D layered inorganic and organic semiconductors to make them suitable for applications.

- ✓ **Summary of my Ph.D. Thesis work:** Understanding of growth dynamics and control over dimension and morphology of various 1D wide bandgap semiconductor nanostructures (such as Nanowires, triangular nanoflakes), particularly my thesis was based upon four materials **ZnO, GeO_2, MoO_3 and GaN**. As a part of my thesis work we have grown morphology controlled hetero-nanostructures of Au and ZnO with varying oxygen defect concentrations on various orientation Si substrates as well as on Zn and O terminated **single crystalline ZnO(0001) substrates**. We have succeeded in growing various metal-semiconductor hetero-nanostructures (Au-ZnO, Ag-MoO_3, etc.) in a single step CVD technique. For the 1st time we have explored the role of native oxide at the interface of metal catalyst and Si substrates towards the VLS growth of Au-ZnO hetero-nanostructures. ***This is one of the major findings from the growth aspect, which could be very much useful for understanding the chemical vapor transported growth of any kind of semiconductor nanostructures on Si substrates*.** We have employed these HNs (Au-ZnO and Ag-MoO_3) coated Si substrates as a free standing *Surface Enhanced Raman Spectroscopy (SERS) substrates* to detect extremely low concentrations of organic dyes and specific biological molecule (such as glucose). We also have extended the use of above

mentioned HNs/Si towards the photocatalytic degradation of organic compounds and microorganisms (Like Phenol, rhodamine B, etc.) in water by *harnessing visible part of the electromagnetic solar spectrum*. This visible light driven photocatalytic application of our as-grown HNs samples are really interesting and worthy to produce in large scale to treat industrial waste water, which could be very much useful in controlling water pollution. We have applied our unique shaped Au-ZnO and Ag-MoO_3 hetero-nanostructures for *cold electron filed emission applications*. ***We have studied work function modulation of ZnO and MoO_3 nanostructures due to the presence of oxygen vacancy and metal nanoparticles conjugated with them, using experiment (Kelvin probe force microscopy) and 1st principle density functional theory (DFT) calculations.*** Here, our focus was made on relating the field emission properties with experimentally determined local work function variation and comparing with model DFT calculations. As a part of my thesis work intrinsically self-assembled Au NPs (with strong LSPR property) capped ZnO and GeO_2 hetero-nanostructures of various dimensionalities and oxygen defects densities are also utilized towards ***UV-Visible light photodetector device applications***.

Beyond conventional inorganic semiconductors, now 2D materials have gathered tremendous attention because of unique physical, optical and electrical properties emerging from their atomic-level thickness, smaller than the mean free path that allows ballistic transportation of the carriers including, electrons, holes, excitons, and phonons. Inspired from previous research on 2D materials, ***In my 1st (at IIT Kharagpur) and 2nd (at Bar Ilan University) Postdoctoral position***, I was fully engaged on the growth of high quality inorganic as well as organic 2D layered material (Graphene, transition metal dichalcogenides, MoO_2, g-C_3N_4, $SnNcCl_2$, PTCDI-C8) using various chemical and physical routs. We have optimized growth of various Π-conjugated organic semiconductors (p-type and n-type) on inorganic semiconductors using organic molecular beam epitaxy (OMBD) technique for highly efficient electronic and optoelectronic applications (Such as, Photodetectors, LEDs, Solar cells and FET). One of our main mottos was electron microscopy (SEM, TEM and STEM) study of the surface and interfaces and tailoring their physical and chemical properties according to the demand of multidisciplinary applications, especially in the field of electronic and optoelectronic devices. Emphasizing on photodetection, photovoltaic (***solar cell***) and electroluminescencent (***LED***) device applications, I have optimized several high mobility efficient hole transporting layers (HTLs) and electron transporting layers (ETLs). At the same time we also have standardized various inorganic and organic dielectric stacks for efficient field effect transistor (FET) and they are perfectly working for several organic channel materials (i.e., OFET). ***In my 2nd Postdoctoral research work at Bar Ilan University (Israel)***, the project was mainly focused on the demonstration of room temperature operating IR photodetectors covering NIR to SWIR (0.7 μm to 2 μm) wavelength ranges, with possible high mobility metal chalcogenides based 2D materials on flexible as well as on silicon platform. Emphasizing on our interested electromagnetic wavelength region, we have established large scale growth of rage of promising 2D materials systems, graphene, molybdenum, antimony and bismuth based chalcogenides (S, Se and Te) using chemical vapor transport and chemical exfoliation techniques. We have studied valley polarization

and its manipulation via coating with sulfur rich organic molecular layer on monolayer MoS_2 samples. Utilizing as-grown high quality monolayer MoS_2 we have successfully fabricated and demonstrated different types of photodetector devices. ***In my current position at Yonsei University (South Korea)***, we are focussing on the CVD growth of advanced new variety of 2D materials (GeSe, GeS, SnSe etc.), making their heterostructures and in-situ transmission electron microscopy studies under different external influences. We have found interesting results about growth of various metals on exfoliated Black phosphorus samples and explored anisotropic diffusion dynamics of atoms on BP using in-situ TEM.

12. Papers Published, Communicated and to be Communicated:

34) *P-type* β-MoO_2 Nanostructures on n-Si by Hydrogenation Process: Synthesis and Application towards Self-Biased UV-Visible Photodetection.

P. Guha,[†] **Arnab Ghosh,**[†,*] A. Sarkar, S. Mondal, S. K. Ray, D. K. Goswami[*] and P. V. Satyam (†→ Equal contribution; *→ Corresponding author)

Nanotechnology 30, 035204 (2019).

33) Plasmonics in Atomically-Thin Crystalline Silver Films.

Z. M. Abd El-Fattah, V. Mkhitaryan, J. Bredde, L. Fernandez, Q. Guo, C. Li, **Arnab Ghosh**, A. R. Echarri, Doron Naveh, F. Xia, J. E. Ortega and F. Javier García de Abajo

ACS Nano 13(7), 7771-7779 (2019).

32) Organic Field-Effect Transistor-Based Ultrafast, Flexible, Physiological-Temperature Sensors with Hexagonal Barium Titanate Nanocrystals in Amorphous Matrix as Sensing Material.

Suman Mandal, M. Banerjee, S. Roy, A. Mandal, **Arnab Ghosh**, Biswarup Satpati and Dipak K. Goswami

ACS Appl. Mater. Interfaces 11(4), 4193-4202 (2019).

31) Graphene Schottky Varactor Diodes for High-Performance Photodetection.

A. Levi, M. Kirshner, O. Sinai, E. Peretz, O. Meshulam, **Arnab Ghosh**, N. Gotlib, C. Stern, S. Yuan, Fengnian Xia and Doron Naveh

ACS Photonics 6(8), 1910-1915 (2019).

30) Nitrogen vacancy and hydrogen substitution mediated tunable emission properties of g-C_3N_4 2D layered structures: Applications towards Blue LED to broad-band photodetection.

Arnab Ghosh, R. Thapa, A. Sarkar, P. Guha, S. Mondal, S. K. Ray and D. K. Goswami

Manuscript to be submitted (September, 2019).

29) Self-biased panchromatic photodetection performance of CVD grown ZnO thin film on coherently embedded Au nanostructures in Si: An enhanced plasmonic effect.

Arnab Ghosh, P. Guha, S. Mukherjee, A. Sarkar, A. Bhukta, P. V. Satyam, Samit K. Ray and Dipak K. Goswami

Manuscript to be submitted (September, 2019).

28) Growth of Au capped GeO_2 nanowires for visible-light photodetection.

Arnab Ghosh,* P. Guha, S. Mukherjee, R. Bar, S. K. Ray and P. V. Satyam*

Appl. Phys. Lett. 109, 123105 (2016). **(*→ Corresponding author)**

27) Tuning Work Function of Randomly Oriented ZnO nanostructures by capping with Faceted Au nanostructure and Oxygen defects: Enhanced Field Emission Experiments and DFT studies.

Arnab Ghosh, P. Guha, R. Thapa, S. Sinthika, M. Kumar, B. Rakshit, T. Dash, R. Bar, S. K. Ray and P. V. Satyam

Nanotechnology 27, 125701 (2016).

26) Simple Growth of Faceted Au–ZnO Hetero-nanostructures on Silicon Substrates (Nanowires and Triangular Nanoflakes): A Shape and Defect Driven Enhanced Photocatalytic Performance under Visible Light.

Arnab Ghosh, P. Guha, A. K. Samanatara, B. K. Jena, R. Bar, S. K. Ray and P. V. Satyam

***ACS Appl. Mater. Interfaces 7 (18), 9486–9496* (*2015*)**.

25) Study of Faceted Au nanoparticle capped ZnO nanowires: Antireflection, Surface Enhanced Raman Spectroscopy and Photoluminescence aspects.

Arnab Ghosh, R. R. Juluri, P. Guha, R. Sathyavathi, A. Dash, B. K. Jena and P. V. Satyam

J. Phys. D: Appl. Phys. 48, 055303(2015).

24) Polarity selective etching: A self-assisted route for fabricating high density of c-axis oriented tapered GaN nanopillars.

Arnab Ghosh, H. P. Bhasker, A. Mukherjee, T. Kundu, B. P. Singh, S. Dhar, S. De and A. Chowdhury

J. Appl. Phys. 110, 033528 (2011).

23) Ag nanoparticles decorated molybdenum oxide structures: Growth, characterizations, DFT studies and their application for enhanced field emission.

P. Guha, **Arnab Ghosh**, R. Thapa, E. M. Kumar, R. Singh and P. V. Satyam

Nanotechnology 28, 415602 (2017).

22) Effect of Au thickness on Au-Ag bimetallic growth on reconstructed Si(5 5 12) Surfaces.

A. Bhukta, **Arnab Ghosh**, P. Guha, P. Maiti and P. V. Satyam

Appl. Phys. A 123, 174 (2017).

21) MoS_2 Quantum Dots as Efficient Catalyst Materials for the Oxygen Evolution Reaction.

B. Mohanty, M. Ghorbani, S. Kretschmer, **Arnab Ghosh**, P. Guha, S. K. Panda, B. Jena, A. V. Krasheninnikov and B. K. Jena

ACS Catal. 8, 1683–1689 (2018).

20) In-situ Synchrotron X-ray Diffraction Study of Coherently Embedded Silver Nanostructures Growth in Silicon.

P. Guha, R. R. Juluri, A. Bhukta, **Arnab Ghosh**, S. Maiti, A. Bhattacharya, V. Srihari and P. V. Satyam

CrystEngComm. 19, 6811-6820 (2017).

19) Filled-carbon nanotubes: 1 D nanomagnets possessing uniaxial magnetization axis controlled by magnetic field gradient.

R. Kumari, A. Singh, B. S. Yadav, D. R. Mohapatra, **Arnab Ghosh**, P. Guha, P. V. Satyam, M. K. Singh, P. K. Tyagi

Carbon 119, 464-475 (2017).

18) Covalently Connected Carbon Nanotubes as Electrocatalysts for Hydrogen Evolution Reaction through Band Engineering.

S. Pal, M. Sahoo, V. T. Veettil, K. K. Tadi, **Arnab Ghosh**, P. V. Satyam, R. K. Biroju, P. M. Ajayan, S. K. Nayak and T. N. Narayanan

ACS Catal. 7, 2676−2684 (2017).

17) Highly Active 2D Layered MoS_2-rGO Hybrids for Energy Conversion and Storage Applications.

S. Kamila, B. Mohanty, A. K. Samantara, **Arnab Ghosh**, P. Guha, B. Jena, P. V. Satyam, B. Mishra and Bikash K. Jena

Sci. Rep. 7, 8378 (2017).

16) Effect of dry air on interface smoothening in reactive sputter deposited Co/Ti Multilayer.

A. Biswas, A. Porwal, D. Bhattacharya, C. L. Prajapat, **Arnab Ghosh**, M. Nand, C. Nayak, S. Rai, S. N. Jha, M. R. Singh, D. Bhattacharyya, S. Basu and N.K. Sahoo

Appl. surf. Sci. 416, 168-177 (2017).

15) Silver Endotaxy in Silicon under Various Ambient Conditions and their use as Surface Enhanced Raman Spectroscopy Substrates.

R. R. Juluri, **Arnab Ghosh**, A. Bhukta, Sathyavathi R. and P. V. Satyam

Thin Solid Films 586, 88–94 (2015).

14) Tunable optoelectronic properties of pulsed dc sputter-deposited ZnO:Al thin films: Role of growth angle.

M. Kumar, R. Singh, S. Nandi, **Arnab Ghosh**, S. Rath and T. Som

J. Appl. Phys. 120, 015302 (2016).

13) Coherently Embedded Ag Nanostructures in Si: 3D Imaging and their application to SERS.

R. R. Juluri, A. Rath, **Arnab Ghosh**, A. Bhukta, Sathyavathi R., D. N. Rao, K. Mueller, K. Frank, M. Schowalter, T. Grieb, F. Krause, A. Rosenauer and P. V. Satyam

Sci. Rep. 4, 4663 (2014).

12) Substrate symmetry driven endotaxial silver nanostructures by chemical vapor deposition.

R. R. Juluri, A. Rath, **Arnab Ghosh** and P. V. Satyam

J. Phys. Chem. C 117 (25), 13247-13251 (2013).

11) Multilayer Ge Nanocrystals embedded within Al_2O_3 matrix for high performance floating gate memory devices.

R. Bar, R. Aluguri, S. Manna, **Arnab Ghosh**, P. V. Satyam and S. K. Ray

Appl. Phys. Lett. 107, 093102 (2015).

10) Facile synthesis of single crystalline n- / p- type ZnO nanorods by lithium substitution and their photoluminescence, electrochemical and photocatalytic properties.

I. Thakur, S. Chatterjee, S. Swain, **Arnab Ghosh**, S. K. Behera and Y. S. Chaudhary

New J. Chem. 39, 2612-2619 (2015).

9) Electron irradiation induced buckling, morphological transformation, and inverse Ostwald ripening in nanorod filled inside carbon nanotube.

Anshika Singh et al.,

Appl. surf. Sci. 360, 1003-1008 (2016).

8) Growth of Ag nanostructures on high index Si (5 5 12) surfaces under UHV conditions: Effect of prior surface treatment before deposition.

A. Bhukta, P. Guha, **Arnab Ghosh**, P. Maiti and P. V. Satyam

Appl. Phys. A 122, 356 (2016).

7) Study of initial stages of growth of Au-assisted epitaxial Ge nanowires on clean Ge(100) Surface.

A. Rath, J. K. dash, R. R. Juluri, **Arnab Ghosh** and P. V. Satyam

CrystEngComm. 16, 2486-2490 (2014).

6) A Bioinspired Approach for Shaping Au Nanostructures: The Role of Biomolecule Structures in Shape Evolution.

S. C. Sahu, A. K. Samantara, **Arnab Ghosh** and B. K. Jena

Chem. Eur. J. 19, 8220-8226 (2013).

5) Sandwiched Graphene with Nitrogen, Sulphur co-doped CQDs: Efficient Metal Free Material for Energy Storage and Conversion Application.

A. K. Samantara, S. C. Sahu, **Arnab Ghosh** and B. K. Jena

J. Mater. Chem. A 3, 16961-16970 (2015).

4) Polysaccharide-capped silver nanoparticles inhibit biofilm formation and eliminate multi-drug-resistant bacteria by disrupting bacterial cytoskeleton with reduced cytotoxicity towards mammalian cells.

S. Sanyasi, R. K. Majhi, S. Kumar, M. Mishra, **Arnab Ghosh**, M. Suar, P. V. Satyam, H. Mohapatra, C. Goswami and L. Goswami

Sci. Rep. 6, 24929 (2016).

3) Highly Porous Pd Nanostructures and Reduced Graphene Hybrids: Excellent Electrocatalytic Activity towards Hydrogen Peroxide.

S. C. Sahu, T. Behera, A. Dash, B. Jena, **Arnab Ghosh** and B. K. Jena

New J. Chem. 40, 1096-1099 (2016).

2) Photoluminescence study on irradiated yttria stabilized zirconia.

R. Halder, P. Sengupta, V. Sudarsan, **Arnab Ghosh** , A. Bhukta, G. Sharma, I. Samajdar and G.K. Dey

J. Nucl. Mater. 456, 359-368 (2014).

1) Optical properties of GaN Nanopillars fabricated using ICPRIE technique.

H. P. Bhasker, P. Ghosh, **Arnab Ghosh** , A. Mukherjee, B. P. Singh and S. Dhar

AIP Conf. Proc. 1447, pp. 1089-1090 (2012).

13. Presentations (Oral/Poster) in Conference/School/Workshop Attended:

1) Workshop on Electron Microscopy (WEM2011), 23rd – 25th Nov 2011 IOP Bhubaneswar, Odisha, India .

2) Shape Transition in Au/Si (100) System: Role of Surface oxide and Vacuum level.

A. Rath , J. K. Dash , R. R. Juluri1, **Arnab Ghosh***, A. Rosenauer and P. V. Satyam 2nd International Conference on advanced Nanomaterials and Nanotechnology (ICANN 2011), 8th – 10th Dec 2011, IIT Guwahati , Assam, India.

3) Role of vacuum level on surface morphological modifications in Au/Si(100) system: An in-situ and ex-situ TEM study.

A. Rath, J. K. Dash, R. R. Juluri, **Arnab Ghosh*** and P. V. Satyam

The 33rd Annual Meeting of EMSI (EMSI 2012), IISc Bangalore, 2nd - 4th July 2012, Karnataka, India.

4) Advanced School on High Resolution Transmission Electron Microscopy (ASTEM 2013), 4th – 8th March 2013, IOP Bhubaneswar, Odisha, India.

5) Structure and optical properties of one-dimensional ZnO nanostructures on silicon substrate.

Arnab Ghosh*, R.R. Juluri and P.V. Satyam

International Conference on Electron Microscopy and 34th Annual Meeting of the EMSI (EMSI 2013), 3rd – 5th July 2013, SINP Kolkata, West Bengal, India.

6) Structural Characterization of simultaneously grown two types of Au-ZnO hetero-nanostructures (Nanowires and triangular nanoflakes) using electron microscopy**.**

Arnab Ghosh*, R.R. Juluri, P. Guha, M. Kumar and P.V. Satyam

International Conference on Electron Microscopy and XXXVI Annual Meeting of the Electron Microscope Society of India (EMSI-2015), July 8-10, 2015, Bhuabha Atomic Research Centre Mumbai, Maharashtra, India.

7) Single Step Growth of Au-ZnO Hetero-nanostructures and Their Application as efficient Cold Field Emitter: Experimental study and DFT Simulation.

Arnab Ghosh*, Puspendu Guha, Ranjit Thapa, S. Sinthika, Mohit Kumar, Bipul Rakshit, Tapan Dash and P. V. Satyam

Nanoscale Assemblies of Semiconductor Nanocrystals, Metal Nanoparticles and Single Molecules: Theory, Experiment and Application Workshop (NANOSA2015), 24 - 28 August 2015, Max-Planck-Institut für Physik komplexer Systeme Dresden, Germany.

8) Tuning work function of randomly Oriented ZnO nanostructures by Capping with faceted Au nanostructures and oxygen defects: Enhanced field emission experiments and DFT studies. (**ORAL Presentation**)

Arnab Ghosh*,P. Guha, R. Thapa, S. Selvaraj, M. Kumar, B. Rakshit, T. Dash, R. Bar, S.K. Ray and P.V. Satyam

International Conference on Electron Microscopy and 37th Annual Meeting of the EMSI (EMSI 2016), 2nd – 4th June 2016, IIT BHU, Varanasi-221005, India.

9) Self-biased UV-Visible photodetection application of β-MoO_2 nanostructures grown via hydrogenation of α-MoO_3 structures.

Arnab Ghosh*, P. Guha, Arijit Sarkar, Suman Mandal, Samit K. Ray, Dipak K. Goswami and Parlapalli V Satyam

Emerging Trends on Physics of Surfaces, Interfaces and Nanostructures (ETPSIN), 23rd – 25th November 2017, IACS and SNBNCBS, Kolkata, India.

10) Attended Workshop on "Induced Strain in Atomically Thin Materials"
The British Council's UK-Israel Synergy Programme.

3rd – 4th July, 2018 University of Exeter, Streatham Campus, LSI Building, UK.

11) Black phosphorus templated hetero-epitaxial growth of metallic films.

Arnab Ghosh*, Yangjin Lee, Sol Lee and Kwanpyo Kim

The 11th International Conference on Advanced Materials and Devices (ICAMD 2019), 10th – 13th December 2019, Ramada Plaza Jeju Hotel, Jeju, Korea.

References

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Kharagpur-721302, India.

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