VIDYA KOCHAT

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MATERIALS SCIENCE CENTRE, INDIAN INSTITUTE OF TECHNOLOGY,
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RESEARCH AREAS

Novel growth techniques for 2D materials

Electronics & Optoelectronics in low dimensional systems to explore magnetism, superconductivity, correlations, light-matter coupling induced effects and quantum transport

Electronic and structural phase transitions thermally induced, electric/magnetic field induced and light-induced in 2D materials

PROFESSIONAL EXPERIENCE

ASSISTANT PROFESSOR • IIT KHARAGPUR • FEB 2019 ONWARDS
Materials Science Centre

POSTDOCTORAL FELLOW • RICE UNIVERSITY, USA • APR 2015 - JULY 2017
Smalley Postdoctoral fellow in Quantum Materials
Materials Science and Nano Engineering

RESEARCH ASSOCIATE • INDIAN INSTITUTE OF SCIENCE • DEC 2014 – JAN 2015
Dept. of Physics

EDUCATION

Ph.D • 2009 - 2014 • DEPT. OF PHYSICS, INDIAN INSTITUTE OF SCIENCE
Advisor: Prof. Arindam Ghosh
Thesis: *Impact of Disorder, Magnetism and Proximity-Induced Superconductivity on Conductance Fluctuations in Graphene*

M.Sc • 2007 - 2009 • INDIAN INSTITUTE OF TECHNOLOGY, ROORKEE

B.Sc • 2004 - 2007 • STELLA MARIS COLLEGE, CHENNAI

TECHNICAL EXPERTISE

Novel synthesis techniques of 2D materials

Device fabrication and lithography

AC and DC electronic transport measurements

Ultra-low temperature cryostat technology

Expertise in beam-line facilities at synchrotron (X-ray absorption spectroscopy, ultrafast electron diffraction)

ACHIEVEMENTS AND AWARDS

- Smalley-Curl Fellowship in Quantum Materials by Rice Centre for Quantum materials, 2015.
- Malhotra Weikfield Foundation Nano Science Fellowship Award 2014.
- GATE – 2009 (Graduate Aptitude Test in engineering) rank 11 with a percentile of 99.75 in Physics paper.
- Obtained the CSIR – JRF scholarship in 2008
- Gold medalist during M.Sc from Indian Institute of Technology, Roorkee.
- Umachandran award for the most meritorious student of the department by Dept of Physics, Stella Maris College, Chennai in 2007.
- Visiting Summer Research Fellow of Tata Institute of Fundamental Research during May-July 2008 under the supervision of Dr. V Nanal, Dept. of Nuclear and Atomic Physics, TIFR, Mumbai.
- Summer research fellow of the Indian Academy of Sciences during May-July 2007 under the supervision of Prof.S.V.Bhat, Dept of Physics, Indian Institute of Science, Bangalore.
- Summer Visiting student fellow of the Indian Academy of Sciences during April-June 2006 under the supervision of Dr.S.Kailas, Nuclear Physics Division, Bhabha Atomic Research Centre, Mumbai.

LIST OF PUBLICATIONS

1. "High contrast imaging and thickness determination of graphene with in-column secondary electron microscopy", **Vidya Kochat,** Atindra Nath Pal, E. S. Sneha, Arjun Sampathkumar, Anshita Gairola, S. A. Shivashankar, Srinivasan Raghavan and Arindam Ghosh, *Journal of Appl. Phys.* ***110***, 014315 (2011).

2. "Microscopic mechanism of 1/f noise in graphene: Role of energy band dispersion", Atindra Nath Pal, Subhamoy Ghatak, **Vidya Kochat**, Sneha E. S., Arjun B. S., Srinivasan Raghavan and Arindam Ghosh, *ACS Nano* ***5,*** 2075 - 2081 (2011).

3. "Direct observation of valley-hybridization and universal symmetry of graphene with mesoscopic conductance fluctuations", Atindra Nath Pal, **Vidya Kochat** and Arindam Ghosh, *Physical Review Letters* **109**, 196601 (2012).

4. "Fermi-Edge Transmission Resonance in Graphene Driven by a Single Coulomb Impurity", Paritosh Karnatak, Srijit Goswami, **Vidya Kochat**, Atindra Nath Pal, and Arindam Ghosh, *Physical Review Letters* **113**, 026601 (2014).

5. "Origin of 1/f noise in graphene produced for large-scale applications in electronics", **V. Kochat,** Anindita Sahoo, Atindra Nath Pal, Sneha Eashwer, Gopalakrishnan Ramalingam, Arjun Sampathkumar, Ryugu Tero, Tran Viet Thu, Sanjeev Kaushal, Hiroshi Okada, Adarsh Sandhu, Srinivasan Raghavan, Arindam Ghosh, *IET Circuits, Devices & Systems* **9**, 52 (2015).

6. "Insights on Defect-Mediated Heterogeneous Nucleation of Graphene on Copper", Priyadarshini Ghosh, Shishir Kumar, Gopalakrishnan Ramalingam, **Vidya Kochat**, Madhavan Radhakrishnan, Sukanaya Dhar, Satyam Suwas, Arindam Ghosh, N. Ravishankar and Srinivasan Raghavan, *J. Phys. Chem. C* **119**, 2513 (2015).

7. "Magnitude and Origin of Electrical Noise at Individual Grain Boundaries in Graphene", **Vidya Kochat**, Chandra Sekhar Tiwary, Tathagata Biswas, Gopalakrishnan Ramalingam, Kimberly Hseih, Kamanio Chattopadhyay, Srinivasan Raghavan, Manish Jain and Arindam Ghosh, *NanoLetters* **16**, 562 (2016).

8. "2D Heterostructure coatings of hBN-MoS_2 layers for corrosion resistance", Sajith Vandana, **Vidya Kochat**, Jonghoon Lee, Vikas Varshney, Sadegh Yazdi, Jianfeng Shen, Suppanat Kosolwattana, Soumya Vinod, Robery Vajtai, Ajit K Roy, Chandra Sekhar Tiwary and P M Ajayan, *J. Phys. D: Appl. Phys.* **50**, 045301 (2016).

9. "Metal Immiscibility Route to Synthesis of Ultrathin Carbides, Borides, and Nitrides", Zixing Wang, **Vidya Kochat**, Prafull Pandey, Sanjay Kashyap, Soham Chattopadhyay, Atanu Samanta, Suman Sarkar, Praveena

Manimunda, Xiang Zhang, Syed Asif, Abhisek K. Singh, Kamanio Chattopadhyay, Chandra Sekhar Tiwary, Pulickel M. Ajayan, *Advanced Materials* **29,** 1700364 (2017).

10. "Fluorinated h-BN as magnetic semiconductor", Sruthi Radhakrishnan, Deya Das, Atanu Samanta, Carlos de los Reyes, Liangzi Deng, Lawrence B. Alemany, Thomas K. Weldeghiorghis, Valery N. Khabashesku, **Vidya Kochat**, Zehua Jin, Parambath M. Sudeep, Angel A. Martí, Ching-Wu Chu, Ajit Roy, Chandra Sekhar Tiwary, Abhishek K. Singh, Pulickel M. Ajayan*, Science Advances.* **3**, e1700842 (2017).

11. "Ultrafast non-radiative dynamics of atomically thin $MoSe_2$", Ming-Fu Lin, **Vidya Kochat**, Aravind Krishnamoorthy, Clemens Weninger, Xiang Zhang, Amey Apte, Chandra Tiwary, Renkai Li, Oleg Prezhdo, Rajiv Kalia, Pulickel Ajayan, Aiichiro Nakano, Xijie Wang, Priya Vashishta, David Fritz, Uwe Bergmann *Nature Communications* **8**, 1745 (2017).

12. "Re Doping in 2D Transition Metal Dichalcogenides as a New Route to Tailor Structural Phases and Induced Magnetism", **Vidya Kochat,** Amey Apte, Jordan A. Hachtel, Hiroyuki Kumazoe, Aravind Krishnamoorthy, Sandhya Susarla, Juan Carlos Idrobo, Fuyuki Shimojo, Priya Vashishta, Rajiv Kalia, Aiichiro Nakano, Chandra Sekhar Tiwary and Pulickel M. Ajayan *Advanced Materials* **29**, 1703754 (2017).

13. "Phase Segregation Behavior of Two-Dimensional Transition Metal Dichalcogenide Binary Alloys Induced by Dissimilar Substitution", Sandhya Susarla, **Vidya Kochat*,** Alex Kutana, Jordan A. Hachtel, Juan Carlos Idrobo, Robert Vajtai, Boris I. Yakobson, Chandra Sekhar Tiwary, and Pulickel M Ajayan *Chemistry of Materials* **29**, 7431 (2017).

14. "Quaternary 2D transition metal dichalcogenides with tunable bandgap", Sandhya Susarla, Alex Kutana, Jordan A. Hachtel, **Vidya Kochat**, Amey Apte, Robert Vajtai, Juan Carlos Idrobo, Boris I. Yakobson, Chandra Sekhar Tiwary and Pulickel M. Ajayan *Advanced Materials* **29**, 1702457 (2017).

15. "Directly Identifying Phase Segregation in 2D Quaternary Alloys", Jordan A Hachtel, Sandhya Susarla, **Vidya Kochat**, Chandrasekhar Tiwary, Pulickel Ajayan, Juan Carlos Idrobo, *Microscopy and Microanalysis* **23**, 1438 (2017).

16. "Effect of Carrier Localization on Electrical Transport and Noise at Individual Grain Boundaries in Monolayer MoS_2", Kimberly Hsieh, **Vidya Kochat**, Xiang Zhang, Yongji Gong, Chandra Sekhar Tiwary, Pulickel M. Ajayan and Arindam Ghosh *Nano Letters* **17**, 5452 (2017).

17. "Atomically thin gallium layers from solid-melt exfoliation", **Vidya Kochat**, A. Samanta, Y. Zhang, S. Bhowmick, S. A. S. Asif, Robert Vajtai, A. K. Singh, C. S. Tiwary, P. M. Ajayan *Science Advances* **4** (3), e1701373, 2018.

18. "Consolidation of Functionalized Graphene at Ambient Temperature via Mechano-chemistry", Mohamad A Kabbani, **Vidya Kochat**, Sanjit Bhowmick, Matias Soto, Anirban Som, KR Krishnadas, Cristiano F Woellner, Ygor M Jaques, Enrique V Barrera, Syed Asif, Robert Vajtai, Thalappil Pradeep, Douglas S Galvão, Ahmad T Kabbani, Chandra Sekhar Tiwary, Pulickel M Ajayan, *Carbon* **134**, 491 (2018).

19. "Structural Phase Transformation in Strained Monolayer $MoWSe_2$ alloy", Amey Apte, **Vidya Kochat**, Pankaj Rajak, Aravind Krishnamoorthy, Praveena Manimunda, Jordan A Hachtel, Juan Carlos Idrobo, Syed Asif Syed Amanulla, Priya Vashishta, Aiichiro Nakano, Rajiv K Kalia, Chandra Sekhar Tiwary, Pulickel M Ajayan, *ACS Nano* **12**, 3468 (2018).

20. "Exfoliation of a non-van der Waals material from iron ore hematite", Aravind Puthirath Balan, Sruthi Radhakrishnan, Cristiano F Woellner, Shyam K Sinha, Liangzi Deng, Carlos de los Reyes, Banki Manmadha Rao, Maggie Paulose, Ram Neupane, Amey Apte, **Vidya Kochat**, Robert Vajtai, Avetik R Harutyunyan, Ching-Wu Chu, Gelu Costin, Douglas S Galvao, Angel A Martí, Peter A Aken, Oomman K Varghese, Chandra Sekhar Tiwary, Anantharaman Malie Madom Ramaswamy Iyer, Pulickel M Ajayan, *Nature Nanotechnology* **13**, 602 (2018).

21. "Polytypism in ultrathin tellurium", Amey Apte, Elisabeth Bianco, Aravind Krishnamoorthy, Sadegh Yazdi, Rahul Rao, Nicholas Glavin, Hiroyuki Kumazoe, Vikas Varshney, Ajit Roy, Fuyuki Shimojo, Emilie Ringe, Rajiv K Kalia, Aiichiro Nakano, Chandra Sekhar Tiwary, Priya Vashishta, **Vidya Kochat** and Pulickel M Ajayan, *2D materials* **6**, 015013 (2018).

22. "Optical control of non-equilibrium phonon dynamics", Aravind Krishnamoorthy, Ming-Fu Lin, Clemens Weninger, Xiang Zhang, Ruru Ma, Alexander Britz, Amey Apte, **Vidya Kochat**, Chandra Sekhar Tiwary, Jie Yang, Suji Park, Renkai Li, Xiaozhe Shen, Xijie Wang, Rajiv Kalia, Aiichiro Nakano, Fuyuki Shimojo, David Fritz, Uwe Bergmann, Pulickel Ajayan, Priya Vashishta *(under review).*

BOOK CHAPTER

1. Vidya Kochat, Srijith Goswami, Atindra Nath Pal and Arindam Ghosh, (2012) *Physics of Electrical Noise in Graphene, in Graphene: Synthesis, Properties, and Phenomena* (eds C. N. R. Rao and A. K. Sood), Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany. doi: 10.1002/9783527651122.ch5

CONFERENCE PROCEEDINGS

1. "Universal Conductance Fluctuations as a direct probe to valley coherence and universality class of disordered graphene", Vidya Kochat, Atindra Nath Pal and Arindam Ghosh, *AIP Conference Proceedings* 1566, 161 (2013).

2. "Reading valley-hybridization and universal symmetry of graphene with mesoscopic conductance fluctuations", V Kochat, AN Pal, A Ghosh, *APS meeting abstracts* (2014).

3. "Conductivity noise as a transport-based probe to study the charge-carrier transmission across grain boundaries in polycrystalline graphene", Vidya Kochat, Chandra Sekhar Tiwary, Tathagata Biswas, Gopalakrishnan Ramalingam, Srinivasan Raghavan, Kamanio Chattopadhyay, Manish Jain, Arindam Ghosh, *Bulletin of the American Physical Society* 60 (2015).

4. "Photo-induced Subpicosecond Temperature Jump in MoSe2 bilayer", Ming-Fu Lin, Clemens Weninger, Vidya Kochat, Amey Apte, Xiang Zhang, Pulickel Ajayan, Oleg Prezhdo, Kristin Persson, Aiichiro Nakano, Renkai Li, Xijie Wang, Priya Vashishta, David Singh, David Fritz, Uwe Bergmann, *Bulletin of the American Physical Society* 62 (2017).

5. "Anomalous Number Fluctuation Noise in Localized Transition Metal Dichalcogenide Layers: Generalization of McWhorter's Mechanism", Kimberly Hsieh, Subhamoy Ghatak, Vidya Kochat, Xiang Zhang, Yongji Gong, Chandra Sekhar Tiwary, Sanjeev Kaushal, Pulickel M Ajayan, Arindam Ghosh, *MRS Advances* 3, 299 (2018).

6. "Ultrafast Electron-Phonon and Phonon-Phonon Interactions in Multilayer 2H-MoTe2", Ming-Fu Lin, Aravind Krishnamoorthy, Clemens Weninger, Xiang Zhang, Vidya Kochat, Amey Apte, Xiaozhe Shen, Rajiv Kalia, Pulickel Ajayan, Aiichiro Nakano, Priya Vashishta, Xijie Wang, David Fritz, Uwe Bergmann, *Bulletin of the American Physical Society* (2018).

7. “Quaternary two dimensional transition metal dichalcogenide alloys”, Sandhya Susarla, Alex Kutana, Jordan Hachtel, Vidya Kochat, Amey Apte, Robert Vajtai, Juan Carlos Idrobo, Boris Yakobson, Chandra Sekhar Tiwary, Pulickel Ajayan, *Bulletin of the American Physical Society* (2018).

8. “Structural phase transition and magnetic behavior in two-dimensional rhenium-doped molybdenum diselenide”, Amey Anant Apte, Vidya Kochat, Jordan Hachtel, Hiroyuki Kumazoe, Aravind Krishnamoorthy, Sandhya Susarla, Juan Carlos Idrobo, Fuyuki Shimojo, Priya Vashishta, Rajiv Kalia, Aiichiro Nakano, Chandra Sekhar Tiwary, Pulickel Ajayan, *Bulletin of the American Physical Society* (2018).