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1. Academic & Professional Experience

YEAR	Position held/ Organization	Accomplished research work
2012-	• Full Professor, Physics, Univ. of Witwatersrand	• Emergent diamond quantum technology
2008-11	• Associate Professor (Tenured since early 2009)	• Developed a lab for nano-device fabrication
2007-08	• Senior Lecturer, Physics, Witwatersrand	Transport properties and nano-electronics
2003-06	• Senior Research Fellow, Univ. of Surrey, UK	• Nano-Carbon based quantum devices
2002-03	• Asst. Professor Indian Institute of Technology	• Diamond and Silicon Nanowires
2001	• Research fellow, Pennsylvania State University	• Nanotube & Nanowires: Optics & spectroscopy
2000	• Research Associate, Materials Science Division, Argonne National Laboratory, USA	• Ultra-nanocrystalline diamond, low temperature transport and spectroscopy
1998-99	• Alexander von Humboldt Fellow, Institute of Physics, Tech University of Chemnitz, Germany	• Establishing transport in nanostructure of N-doped carbon by microscopy & spectroscopy
1997	• CIES Student Research Fellow, Institute of Materials-Jean Rouxel, CNRS-Nantes, France	• Electronic structure of nanostructured DLC films by photoelectron spectroscopy
2014	| Visiting Professor at University of Leeds, UK	• Spintronics and spin-triplet superconductivity
2019	| Visiting Professor at MISiS-NUST, Moscow, Russia	• Carbon based quantum technology

2. Higher Education

Degree	Institution	Started	Awarded	Subject/Major
Ph. D	Physics Department, Indian Institute of Science, Bangalore, India	08/1993	12/1997	• Condensed Mater Physics (Experiment/Simula (on Amorphous and nano-carbon systems)
MSc.	University of Calcutta, Kolkata, India	10/1990	02/ 1993	• Pure Physics (special in High Energy Physics)

Title of Thesis: Structure and Electronic properties of amorphous conducting carbon films

3. Major Research Grants

- International Grant Competition of National University Science & Tech. MISiS, Russia (2019) (US$ 25k)
- Recipient of multilateral BRICS program grant (2017) (US$ 150k)
- Total grant (2007-2016) ~ US$ 3 million and developed the *Nano-Scale Transport Phys. Lab.*
- National Nanotechnology Flagship Program by the NRF (SA) in 2008 and 2012 (over US$ 0.5 million)
- National Nanotechnology Equipment Program grant (2009, 2010 and 2011) US$ 2.5m
- Alexander von Humboldt Scholarship, (1998), Germany

4. Supervision of Higher Degrees

- Supervised *six* PhD and *eight* MSc Research students.
- Supervised *six* post-doctoral researchers *four* in experimental and *two* in theoretical physics

5. Expertise

- Quantum Transport in superconducting carbon-based devices and quantum simulation
- Nano-scale Transport at low temperatures, high magnetic fields, high frequency and modeling
- Nano-electronics: Device fabrication, characterization at extreme conditions and modeling
- Nanostructure analysis of a range of materials by microscopy (HRTEM) and synchrotron facility
- Nanostructure analysis by spectroscopy (Optical, Raman, spin resonance, photoelectron etc.)
- Synthesis of diamond, Nanowires by Laser Deposition, Microwave CVD and plasma diagnostics

6. Major Accomplishments.

- **Metal-insulator transition in carbon films (2001)**: Discovery of high *n*-type metallic conduction in nitrogen doped nano-diamond films from low temperature electrical and magneto transport measurements. N-type doping of diamond is useful for developing diamond electronics and can be a potential candidate for unconventional superconductivity or making of hybrid superconducting technology combined with other superconducting materials. This work complements to my earlier work on high pressure induced transition from insulating carbon film to the true metallic phase which was the first demonstration of high conductivity in any completely disordered carbon system. [*Appl. Phys. Lett.* **79**, 1441 (2001); *Appl. Phys. Lett.* **71**, 632 (1997)] cited > 500 times
- **Quantum transport in carbon superlattices (2006):** Discovered resonant tunnel transport in amorphous carbon superlattice structures made of diamond-and graphene-like multilayered structures. The peak to valley ratio of the tunnel current exceeding a value of 2 showed promises for carbon as a quantum device better than amorphous silicon system. Our all carbon devices showed record memory switching in the frequency range of 100 GHz demonstrating that such superconducting junctions can be operated at a very high speed. [*Nature Materials* **5,** 19 (2006)] cited > 100 times
- **High speed transport in carbon nanotubes (2007& 2014)**: We discovered tunable gigahertz transport in carbon nanotubes which created some of the most important applications such as resonators and transmission lines in emergent quantum technology. We have also discovered one dimensional plasmonic transport in nanotubes measured at low temperatures which can be useful in designing a new type of Josephson junction as a part of a hybrid superconducting system. [*Nano Letters* **7**, 2672 (2007), *Appl. Phys. Lett.* **105**, 173511 (2014)]
- **Kondo effect and spin valve behavior in metal functionalized carbon nanotubes and graphene (2018):** We discovered a new class of spin valves in metal decorated carbon nanotubes. Functionalization of carbon nanotubes with metal ligands has been found to be extremely challenging. We discovered a technique to functionalize them with rare earth elements in a controlled manner and decorated the nanotube with nearly periodic arrays of nanomagnetic clusters. We discovered a Kondo lattice like structure in nanotubes decorated with Gd particles which can have enormous applications in high-speed magnetic sensors. Fast spin transport in these functionalized 1d materials can be useful for developing hybrid quantum devices in association with diamond and graphene. We also discovered signatures of Kondo effect in reduced graphene oxide films and successfully demonstrated high speed

transport in graphene, which could be useful as junctions in superconducting carbon. [*Sci. Rep.* **8**, 8057 (2018); *Phys. Status Solidi, Rapid Research Lett.* ***6****, 56 (2012)*]

- **Two dimensional transport in superconducting diamond films (2018):** We discovered layered structures in heavily boron doped superconducting diamond films and associated the two dimensional transport behavior with the BKT transition in these materials. Such studies will be helpful to develop the possibility for topological superconductivity in diamond instead of superconductivity in the bulk diamond. [*EPL* **122**, 57004 (2018)]
- **Kondo effect in nanocrystalline superconducting diamond (2019):** Demonstrated spin related effect in nanocrystalline superconducting films due to the presence of well aligned grain boundary regions. Coexistence of magnetism and superconductivity can be seen in a single element from the unique microstructures of diamond which cannot be seen in other materials easily. Our observation of a Kondo effect in this system suggests the possibility of diamond based topological superconductivity and developing spin qubits. [*EPL* **124**, 57004 (2018)]
- **Spin triplet superconductivity (2020):** Discovered interfacial spin triplet superconductivity in heavily boron doped diamond films using superconducting tunnel junction in the grain boundary regions of the films. We analyzed our results based on the Rashba spin orbit coupling behavior and from detailed low temperature magneto transport measurements. We identified the zero bias conductance peaks in the samples which are seen in the spin triplet superconductors. This work can lead to the discovery of p-wave superconductivity in diamond which is challenging to study in other superconductors and spin qubits. [*New J of Phys.* (2020), available online]
- **Resonant tunnel transport in amorphous superlattice structures (2016):** We simulated the structure of grain boundary region showing high metallic transport and the carbon superlattices showing tunnel transport by theoretical modelling and discovered signatures of high-speed tunnel transport. This work was also useful to establish interfacial superconductivity in nano diamond systems and understanding the effect of disorder in superconducting transition in boron doped diamond films. [*Sci. Rep.* **6**, 35526 (2016)]
- **Quantum simulation of diamond NV centers and quantum many body physics (2019):** Developed techniques to simulate the microwave/light interactions with NV centers as spin qubits which are emulated by near term quantum computers made from superconducting qubits. We demonstrated how to solve quantum many body problems such as weak anti-localization, spin-orbit coupling, the Kondo interactions and vortex matter by simply rotating the superconducting qubits. This work will be useful in the design of new unconventional superconducting materials and topological matter as well as hybrid qubit systems. [*Appl. Phys. Lett.* **115**, 233501 (2019); arXiv:2009.00567; arXiv:2009.00570]
- **Superconducting diamond based qubits and resonating circuits (2020):** Recently we designed and tested the first superconducting diamond nanowire based qubits and resonators which show high performance [*JPhCS* **1461**, 012014 (2020), a full report to appear].

7. Selected Publications

Over Ninety research papers including *four* book chapters (selected publications are given below):

- 'Effects of Rashba-spin-orbit coupling on superconducting boron-doped nanocrystalline diamond films: evidence of interfacial triplet superconductivity' **S. Bhattacharyya**, D. Mtsuko, C. Allen, & C. Coleman, ***N J of Phys*****.** (2020).
- 'Enhanced magnetic properties and spin valve effects in gadolinium carbon nanotube supramolecular complex' S. Ncube, C. Coleman, A. Strydom, E. Flahaut, A. de Sousa, & **S. Bhattacharyya**, ***Scientific Reports*** **8**, 8057 (2018).

- 'Coherent quantum transport features in carbon superlattice structures' R. McIntosh, S.J. Henley, S.R.P. Silva, and **S. Bhattacharyya**, ***Scientific Reports* 6**, 35526 (2016).
- 'Temperature induced diffusive to ballistic transport in Double walled carbon nanotubes' G. Chimowa, E. Flahaut, and **S. Bhattacharyya**, ***Appl. Phys. Lett.* 105**, 173511 (2014).
- Theoretical model of nano-electronic transport in structurally disordered carbon' M. V. Katkov and **S. Bhattacharyya**, ***EPL* 99**, 37005 (2012).
- 'Origin of conductivity cross over in entangled multi-walled carbon nanotube network filled by iron' G. Chimowa, E. C. Linganiso, D. Churochkin, N. J. Coville, and **S. Bhattacharyya**, ***Phys. Rev. B* 84**, 205429 (2011).
- 'High frequency response of single walled carbon nanotubes' L. Gomez-Rojas, **S. Bhattacharyya**, E. Mendoza, D.C. Cox, J.M. Rosolen, S.R.P. Silva, ***Nano Lett.* 7**, 2672 (2007).
- 'Resonant tunnelling & fast switching in amorphous-carbon quantum-well structures' **S. Bhattacharyya**, S.J. Henley, E. Mendoza, L. Gomez-Rojas, J. Allam, S.R.P. Silva, ***Nature Materials* 5,** 19 (2006).
- 'Mechanism of conduction in nitrogen doped nanocrystalline diamond', **S. Bhattacharyya**, ***Phys. Rev. B* 70**, 125412 (2004).
- 'Synthesis and characterization of highly conducting nitrogen-doped ultra-nanocrystalline diamond films' **S. Bhattacharyya** et al., ***Appl. Phys. Lett.* 79**, 1441 (2001).
- 'Spectroscopic determination of the structure of amorphous nitrogenated carbon films', **S. Bhattacharyya**, C. Carinaud, and G. Turban, ***J. Appl. Phys.* 83**, 4491 (1998).

8. Recent Invited Lectures (since 2016)

- (Plenary speaker) Int. Conf. on Nanosci & Nanotech – ICNAN '19, Vellore (November/2019)
- (Keynote speaker) International Magnetism & Magnetic Mater Conf., Venice (Nov/2019)
- (Keynote speaker) 3rd Int. Conf. on Materials Sci. & Materials Chem., Vienna (Oct/2019)
- (Invited speaker) 4th METANANO Conf. on Nanophononics and Metamater, St. Petersburg, Russia (Jul/2019)
- (Invited speaker) IEEE (8th Int. Conf. on Manipulation, Manufacturing & Measurement on the Nanoscale), Hangzhou, China (August/2018)
- (Keynote speaker) 2nd Int. conf. & Expo on Diamond, Graphene, Carbon, Las Vegas, (Apr/2018)
- (Keynote speaker) Intern. Conf. in Diamond and Carbon materials, Chicago, USA (July/2017)
- (Invited speaker) 2nd Global Nanotechnology Congress and Expo, Las Vegas (December/2016)
- (Invited speaker) BITs 6th International Conf in Nanosci. & Nanotech, Singapore (Oct/2016)
- (Keynote speaker) 4th SMEOS 2016 International Conference, South Africa (September/2016)

9. Presentations on Quantum computing and quantum technology

- (Keynote speaker) IBM Open power workshop Indian Institute of Technol, Madras (Dec, 2019)
- (Invited speaker) IBM York Town heights (October, 2018)
- (Invited speaker) IBM hosted workshop on SC supercomputing in Dallas (2018)
- (Invited speaker) 'prospects of carbon-based quantum computation' IBM Zurich (July, 2017)
- (Keynote speaker) IBM hosted works on High Performance Computing), Johannesburg (2017)
- (Invited speaker) 'Superconducting diamond quantum tech.' NASA Ames Center (2016)

2020

1. 'Anisotropic three-dimensional weak localization in ultrananocrystalline diamond films with nitrogen inclusions' L.W. van Beveren, D.L. Creedon, N. Eikenberg, K. Ganesan, B.C. Johnson, G. Chimowa, D. Churochkin, **S. Bhattacharyya,** and S. Prawer, Phys. Rev. B **101** 115306 (2020).
2. 'Superconducting Diamond as a platform for quantum technologies' C. Coleman, F. Mazhandu, S.J. Reddhi, T. Aslan, D. Wei, C. Huynh, P. Gnauck, and **S. Bhattacharyya,** JPhCS **1461**, 012014 (2020).
3. 'Bottom-up nano-integration route for modified carbon nanotube spintronic device fabrication' I.S. Mosse, A. S. de Sousa, S. Ncube, C. Coleman, **S. Bhattacharyya,** A. Irzhak, S. Gratowski, and V. Koledov, JPhCS **1461**, 012015 (2020).
4. **'**Nano-manipulation and laser treatment as alternative routes for strain engineering in Graphene' C. Coleman, R. Erasmus, D. Mtsuko, S. von Gratowski, V. Koledov, and **S. Bhattacharyya,** JPhCS, **1461**, 012024 (2020).
5. 'Effects of Rashba-spin-orbit coupling on superconducting boron-doped nanocrystalline diamond films: evidence of interfacial triplet superconductivity' **S. Bhattacharyya**, D. Mtsuko, C. Allen, and C. Coleman, New Journal of Physics (2020), in press, available online (arXiv:2009.00475).

- 'Realizing highly entangled states in asymmetrically coupled three NV centers at room temperature' D. Mahony and **S. Bhattacharyya** (arXiv:2009.00570).
- 'Emulating coherent backscattering in multipath tunnel systems on a near-term Quantum computer', Shaman Bhattacharyya and **S. Bhattacharyya** (arXiv:2009.00567).
- 'Observation of non-s wave superconductivity in boron-doped diamond with 0-π Josephson junction array' **S. Bhattacharyya**, C. Coleman, D. Churochkin, and D. Mtsuko (https://arxiv.org/abs/1710.05170).

2019

6. 'Finite bias evolution of bosonic insulating phase and zero bias conductance in boron-doped diamond: A charge-Kondo effect', D. Mtsuko, C. Coleman, and **S. Bhattacharyya**, EPL **124**, 57004 (2018) arXiv:1606.06672.
7. 'Charging effects and anomalous resistive features of superconducting boron doped diamond films', C. Coleman and **S. Bhattacharyya**, AIP Advances **9**, 065118 (2019); doi.org/10.1063/1.5096956
8. 'Hybrid spin-superconducting quantum circuit mediated by deterministically prepared entangled photonic states', K. Mathieson and **S. Bhattacharyya**, AIP Advances **9**, 115111 (2019). http://arxiv.org/abs/1911.00869
9. 'Experimental Simulation of Hybrid Quantum Systems and Entanglement on a Quantum Computer' F. Mazhandu, K. Mathieson, C. Coleman, and **S. Bhattacharyya**, Appl. Phys. Lett. **115**, 233501 (2019) http://arxiv.org/abs/1911.00897

2018

10. 'Enhanced magnetic properties and spin valve effects in gadolinium carbon nanotube supramolecular complex' S. Ncube, C. Coleman, A. Strydom, E. Flahaut, A. de Sousa, and **S. Bhattacharyya** (Scientific Reports **8**, 8057 (2018).
11. **'**Modification of magnetic properties in gadolinium chloride filled multiwall carbon nanotubes**'** S. Ncube, C. Coleman, C. Nie, P. Lonchambon, A. Strydom, E. Flahaut, A. de Sousa, and **S. Bhattacharyya**, J. Appl. Phys. **123**, 213901 (2018).
12. 'Signatures of two dimensional in superconducting nanocrystalline boron-doped diamond films' C. Coleman and **S. Bhattacharyya**, EPL, **122**, 57004S (2018). doi: 10.1209/0295-5075/122/57004
13. 'Influence of structural disorder and Coulomb interactions in superconductor-insulator transition applied to boron-doped diamond' R. McIntosh, N. Mohanta, A. Taraphder, and **S. Bhattacharyya,** AIP Adv. 8, 075109 (2018).

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14. 'Possible Observation of the Berezinskii-Kosterlitz-Thouless transition in Boron-doped diamond films' Christopher Coleman and **S. Bhattacharyya**, AIP Advances **7**, 115119 (2017); https://doi.org/10.1063/1.4986315.
15. 'Quantum Linear Magnetoresistance and Shubnikov De-Haas Oscillation in Suspended Wrinkled and Smooth Multilayer Graphene' C. Coleman, D. Mtsuko, C. Botha, C. Sandrock and **S. Bhattacharyya**, J. Nano Sci. and Nanotech. **17**, 5408 (2017) doi:10.1166/jnn.2017.1383 [arxiv.org/abs/1504.02328].

16. 'Patterned growth of ZnO nanorods by chemical bath deposition' Z. N. Urgessa, J. R. Botha, C. Coleman, and **S. Bhattacharyya**, Physica B (https://doi.org/10.1016/j.physb.2017.06.061).
17. 'Nanomanipulation device fabrication: multilayerd graphene and OFET devices' C. Coleman, S. Khorasani, S. Ncube, D. Mtsuko, C. Botha, C. Sandrock, M. Fernandes, D. Levendis, and **S. Bhattacharyya** in Proc. SPIE 10036, Fourth Conference on Sensors, MEMS, and Electro-Optic Systems, 1003608 (3 February 2017) doi:10.1117/12.2245446
18. 'Quantum device prospects of superconducting nanodiamond films' D. Mtsuko, D. Churochkin, and **S. Bhattacharyya,** Proc. SPIE 10036, Fourth Conference on Sensors, MEMS, and Electro-Optic Systems, 1003608 (3 February 2017) Vol. 10036: Fourth Conference on Sensors, MEMS, and Electro-Optic Systems doi: 10.1117/12.2245593.
19. 'Low temperature magneto transport features of rare earth element functionalized carbon nanotube network devices for spintronic applications', S. Ncube, A. Naicker, C. Coleman, A de Souza, E. Flahaut, A. Strydom, and **S. Bhattacharyya**, Proc. SPIE 10036, Fourth Conference on Sensors, MEMS, and Electro-Optic Systems, doi:10.1117/12.2245405.

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20. 'Nanoscale deformations in graphene by laser annealing' C. Coleman, R. Erasmus and **S. Bhattacharyya**, Appl. Phys. Lett. **109**, 253102 (2017).
21. 'Coherent quantum transport features in carbon superlattice structures' R. McIntosh, S.J. Henley, S.R.P. Silva, and S. Bhattacharyya, *Scientific* Reports **6**, 35526 (2016).
22. ''Observation of Aharonov-Bohm and Al'tshuler-Aronov-Spivak oscillations in the background of universal conductance fluctuations in silicon nanowires' D. Mtsuko, T. Aslan, S. Ncube, C. Coleman, D. Wamwangi, and **S. Bhattacharyya**. (Europhys Lett. **113**, 47002 (2016).). [arxiv.org/abs/1504.02325].

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23. 'Superlattice structure of disordered Carbon' by **S. Bhattacharyya** in CRC Concise Encyclopedia of Nanotechnology Eds. Boris Ildusovich Kharisov, Oxana Vasilievna Kharissova, Ubaldo Ortiz-Mendez CRC Concise Encyclopedia of Nanotechnology, Taylor & Francis (2015). ISBN 9781466580343 - CAT# CRC Prsess; Taylor & Francis Group.
24. 'Electrical and Mechanical Abnormalities in Quantum Superlattice Structures of Diamond-like Carbon' N. Dwivedi, R. McIntosh, S. Kumar, H. K. Malik, C. Dhand, and **S. Bhattacharyya** ACS Appl. Mater. Interfaces **7**, 20726 (2015).
25. 'Observation of one-dimensional plasmonic features in single walled carbon nanotube bundles excited by high frequency signals' G. Chimowa, S. Ncube, and **S. Bhattacharyya**. (Europhys. Lett. **111**, 36001 (2015)). [arxiv.org/abs/1504.02601]
26. 'High frequency transport in nanocrystalline diamond films' G. Chimowa, R. Erasmus, and **S. Bhattacharyya**, Europhys. Lett. **109**, 67002 (2015).

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27. 'Understanding resonant tunnel transport in non-identical and non-aligned clusters as applied to disordered carbon systems' **S. Bhattacharyya** and D. Churochkin, J. Appl. Phys. **116**, 154305 (2014).
28. 'Temperature induced diffusive to ballistic transport in Double walled carbon nanotubes' G. Chimowa, E. Flahaut, and **S. Bhattacharyya**, Appl. Phys. Lett. **105**, 173511 (2014).
29. 'The effect of metal-contacts on carbon nanotube for high frequency interconnects and devices' G. Chimowa and **S. Bhattacharyya**, AIP Advances **4**, 087136 (2014).
30. 'Polarization dependent asymmetric magnetoresistance features in nitrogen-incorporated nanocrystalline diamond films' **S. Bhattacharyya** and D. Churochkin, Appl. Phys. Lett. **105**, 073111 (2014).
31. 'Realizing one-dimensional quantum and high-frequency transport features in aligned single-walled carbon nanotube ropes' S. Ncube, G. Chimowa, Z. Chiguvare and **S. Bhattacharyya**, J. Appl. Phys. **116**, 024306 (2014).

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32. 'Tuning resonant transmission through geometrical configurations of impurity clusters' D. Churochkin, R. McIntosh, and **S. Bhattacharyya**, J. Appl. Phys. **113**, 044305 (2013).

33. Tunnel transport model of nitrogen doped amorphous carbon superstructure' M. V. Katkov, R. McIntosh, and **S. Bhattacharyya**, J. Appl. Phys. **113**, 093701 (2013).
34. 'Theoretical model: Disorder and transport in amorphous nitrogenated carbon ribbons' M. V. Katkov, and **S. Bhattacharyya**, J. Appl. Phys. **113**, 183712 (2013).
35. 'Controlling the activation energy of laser grown graphene-like thin films through disorder induced localization' C. Coleman, R. McIntosh, and **S. Bhattacharyya**, J. Appl. Phys. **114**, 043716 (2013).

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36. 'The effect of tube filling on the electronic properties of Fe filled carbon nanotubes' C. E. Linganiso, G. Chimowa, P. Franklyn, **S. Bhattacharyya**, and N.J. Coville, Materials Chemistry and Physics **132**, 300 (2012).
37. 'The Kondo Effect in Reduced Graphene Oxide Films' R. McIntosh and **S. Bhattacharyya**, Phys. Status Solidi, Rapid Research Letters **6**, 56 (2012). doi:10.1002/pssr.201105493
38. 'Improved Electronic and Magnetic properties of Reduced Graphene Oxide Layers' R. McIntosh, M. A. Mamo, B. Jamieson, S. Roy, and **S. Bhattacharyya,** Europhys. Lett. **97**, 38001 (2012).
39. 'Enhanced Tunnel Transport in Disordered Carbon films incorporated with impurities' M.V. Katkov and **S. Bhattacharyya**, J. Appl. Phys. **111**, 123711 (2012).
40. 'Understanding conductivity crossover in nano-crsytalline diamond films using a disordered superlattice model' G. Chimowa, D. Churochkin, and **S. Bhattacharyya**, Europhys. Lett. **99**, 27004 (2012).
41. 'Theoretical model of nano-electronic transport in structurally disordered carbon' M. V. Katkov and **S. Bhattacharyya**, Europhys. Lett. **99**, 37005 (2012).
42. 'Resonant Transport features of disordered Graphene devices' F. Mohammed and **S. Bhattacharyya**, Europhys. Lett. **100**, 26009 (2012).
43. 'Tuneable anisotropic transport in nitrogen-doped nanocrystalline diamond films: Evidence of a graphite-diamond hybrid superlattice' D. Churochkin and **S. Bhattacharyya**, Europhys. Lett. **100**, 67004 (2012).

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44. 'Tuning the electrical transport properties of double-walled carbon nanotubes by semiconductor and semimetal filling' G. Chimowa, M. Sendova, E. Flahaut, D. Churochkin and **S. Bhattacharyya**, J. Appl. Phys. **110**, 123708 (2011). doi:10.1063/1.3670879.
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47. 'High pressure Raman spectra of silicon nanowires' **S. Bhattacharyya**, D. Churochkin and R. Erasmus, Appl. Phys. Lett. **97**, 141912 (2010).
48. 'Anisotropic 3D weakly localized electronic transport in nitrogen-doped ultrananocrystalline diamond films' K. V. Shah, D. Churochkin, Z. Chiguvare and **S. Bhattacharyya**, Phys. Rev. B **82**, 184206 (2010).

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49. 'Novel electronic structure and transport properties of confined disordered carbon layers' **S. Bhattacharyya**, Phys. Status Solidi B **246**, 1056 (2009).
50. 'Thermoelectric power of amorphous nitrogenated carbon films' **S. Bhattacharyya**, J. Phys. D: Appl. Phys. **42**, 085407 (2009).
51. 'Two-dimensional transport in disordered carbon and nano-crystalline diamond films' **S. Bhattacharyya**, Phys. Rev. B **77**, 233407 (2008).

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52. 'Switching behaviour and high frequency response of amorphous carbon double-barrier structures' **S. Bhattacharyya**, L. Gomez-Rojas, S. J. Henley and R Silva, J. Mat. Sci. and Engg. C **27**, 957 (2007).
53. 'Demonstration of an amorphous carbon tunnel diode' **S. Bhattacharyya** & S.R.P. Silva, Appl. Phys. Lett. **90**, 082105 (2007).
54. 'High frequency response of single walled carbon nanotubes' L. Gomez Rojas, **S. Bhattacharyya**, E. Mendoza, D.C. Cox, J.M. Rosolen and S.R.P. Silva, **Nano Letters 7**, 2672 (2007).
55. 'Observation of delocalized transport and low-dimensionality effects in disordered carbon thin films' **S. Bhattacharyya**, Appl. Phys. Lett. **91**, 142116 (2007).

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56. ***'Resonant tunneling and fast switching in amorphous-carbon quantum-well structures' **S. Bhattacharyya**, S.J. Henley, E. Mendoza, L. Gomez-Rojas, J. Allam, and S.R.P. Silva, **Nature Materials 5,** 19 **(2006)**.
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58. 'NEXAFS study of aligned pi-bonded carbon structures in nitrogenated ta-C films' S. S. Roy, R. McCann, P. Papakonstantinou, J.A. McLaughlin, I. Kirkman, **S. Bhattacharyya,** S.R.P. Silva, J. Appl. Phys. **99**, 043511 **(2006)**.
59. 'Transport in Low-Dimensional carbon' **S. Bhattacharyya** and S.R.P. Silva, Thin Solid Films **482**, 94 (2005).

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60. 'Nanocrystalline diamond' T. Sharda and **S. Bhattacharyya**, in Encyclopedia of Nanoscience and Nanotechnology, edited by H. S. Nalwa (American Scientific Publishers, USA) vol. **2**, pp. 337-370 (2004).
61. *'Phonon Confinement in silicon nanowires' **S. Bhattacharyya** and S. Samui, Appl. Phys. Lett. **84**, 1564 (2004).
62. 'Confinement in Silicon Nanowires: Optical Properties' S. Bhattacharya, D. Banerjee, K. W. Adu, S. Samui, and **S. Bhattacharyya**, Appl. Phys. Lett. **85**, 2008 (2004).
63. *'Mechanism of conduction in nitrogen doped nanocrystalline diamond' **S. Bhattacharyya**, Phys. Rev. B **70**, 125412 (2004).
64. **'**Structure of nitrogenated amorphous carbon from near edge x-ray absorption fine structure' **S. Bhattacharyya**, M. Lübbe, P. R. Bressler, D. R. T. Zahn, and F. Richter, Diamond Relat. Mater. **11**, 8 (2002).

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65. 'Valence band spectra of nitrogen incorporated tetrahedral amorphous carbon film' **S. Bhattacharyya**, C. Spaeth, and F. Richter, J. Appl. Phys. **89**, 2414 (2001).
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