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Dr. Aritra Banerjee

PERSONAL :

Date of Birth : 4th April, 1975
Nationality : Indian
Marital Status : Married

EDUCATIONAL QUALIFICATION:

- Received **B.Sc** (Bachelor of Science) Degree in Physics (Honours) from University of Calcutta, Kolkata, INDIA in 1996.
- Received **M.Sc** (Master of Science) in Physics from University of Calcutta, Kolkata, INDIA in 1998; Specialization Solid State Physics.
- **Ph.D thesis** (Title: *Transport and other properties of some colossal magneto-resistive materials*) awarded on February, 2003 by Jadavpur University, Kolkata under the supervision of Prof. B K Chaudhuri, Department of Solid State Physics Department, Indian Association for the Cultivation of Science, Kolkata-32, INDIA

PROFOSSIONAL AWARDS AND HONORS:

- Awarded as "**Young Scientist**" in Physics in the year 2001 by Indian Science Congress Association, Kolkata-17, India.
- "**Best Thesis**" award in DAE-SOLID STATE PHYSICS SYMPOSIUM-2002, organized by BARC, Mumbai.
- "**Best Oral Presentation**" award in 27th Electron Microscope Society of India conference; organized by National Physical Laboratory, New Delhi--2004.
- "**Best Poster Presentation**" award in Annual Technical Meeting of Indian Institute of Metal, held at Chennai, 2005.
- Life member of *Indian Science Congress Association*; 17 Biresw Guha Street; Kolkata-17, India.
- Life member of *Indian Association for the Cultivation of Science*; Kolkata-32, India.
- Life member of Indian Physics Association; Mumbai-88, India.
- Member, International reviewer board, Russian International Affairs Council, Russian Science Foundation, Russia.

PERMANENT POSITIONS HELD :

- **Scientific Officer-D**, Indra Gandhi Center for Atomic Research, Kalpakkam, Dept. of Atomic Energy, Govt. of India
Responsibilities: To carry out Research & Development activity (for details see in 'research experience' listed below) along with some administrative duties.
Period of work: 21st December, 2004 to 31st January, 2006
- **Assistant Professor**, Department of Physics, University of Calcutta, Kolkata-700 009, INDIA
Responsibilities: Post graduate teaching and basic research in materials science (for details see in 'research experience' listed below).
Period of work: 1st February, 2006 to till date

PROFESSIONAL EXPERIENCES :

- **Research fellow** : Indian Association for the Cultivation of Science; Kolkata-32, INDIA
21st December, 1998 to 9th April, 2003.
- Acted as a **Guest Faculty** in Physics in 'Bengal Engineering and Science University', Howrah, West Bengal, India

During the session 2002-2003.

- **Dr. K S Krishnan Research Associate (DAE-BRNS):** Indira Gandhi Center for Atomic Research, Kalpakkam
10th April, 2003 to 20th December, 2004.
- **Post Doctoral Fellow :** *Laboratoire Photons Et Matière, UPR 5–CNRS, ESPCI, 10 Rue Vauquelin, 75231 PARIS, CEDEX 05, France with Dr. Kamran Behnia.*
November, 2007 to October, 2008

PROJECTS UNDERTAKEN / ONGOING RESEARCH PROJECTS :

- "Transport property study of nanostructured Bismuth alloy based materials" (July 2009 - June 2012), funded by Center for Research in Nanoscience & Nanotechnology, University of Calcutta [Sanctioned amount: Rs. 2.00 Lac].
- "Study on materials for thermoelectric cooling devices: synthesis and characterization of bismuth antimony alloy based materials" (February, 2011-January, 2013), funded by UGC, Govt. of India [Sanctioned Amount: Rs.1.90 Lac]
- "Study of thermoelectric materials with practical application in the field of thermoelectric cooling and thermoelectric power generation" (May 2011-November 2014), funded by DST, Govt. of India under SERC Fast track Scheme for Young Scientists [Sanctioned Amount: Rs. 22.81 Lac].
- "Microstructural Characterization of doped Sb-Te based thermoelectric alloy" (December, 2014-September, 2017), funded by UGC-DAE Consortium for Scientific Research, Indore, Govt. of India. [Sanctioned Amount: Rs. 9.00 Lac (approx)].
- "Structural and thermoelectrical property study of n-type and p-type thermoelectric solid solutions and single and double phases nanocomposite" (September, 2015 to March, 2018), jointly sanctioned by DST, Govt. of India and RFBR, Govt. of Russia under International Co-operation scheme of DST, Govt. of India [Sanctioned Amount: Rs. 24.00 Lac (approx)].
- "Tuning of thermoelectric properties of p-type Sb₂Te₃ and n-type Bi₂Te₃ by ion beams" (April, 2019-March, 2022) funded by IUAC, New Delhi under UFUP Scheme [Sanctioned Amount: Rs. 0.75 Lakh+1 PhD student +Experimental Facilities at IUAC, New Delhi]
- "Magneto-transport property study of thermoelectric composites" (June, 2019-May, 2022) funded by UGC DAE Consortium for Scientific Research, Kolkata Centre under Collaborative Research Scheme project [Sanctioned Amount: Rs. 1.35 Lakh+1 PhD student +Experimental Facilities at UGC DAE CSR, Kolkata Centre]

TEACHING :

- Basic Physics course for Undergraduate Engineering Student at Bengal Engineering College.
- At Dept. of Physics, University of Calcutta: For Post Graduate Student-

General Course:

Solid State Physics (Superconductivity, Defects in Solid etc)

Electronics and Instrumentation – General Course

Mathematical Methods (Selected part)-General Course

Atomic, Molecular and Laser Physics (Molecular and Laser Physics Part)-General Course

Advanced Course:

Condensed Matter Physics (Hartee-Fock Theory, Interacting Free Electron Gas)

Materials Science

TALKS PRESENTED :

- "Hopping conduction in LaMnO_{3+δ} and La_{0.9}Pb_{0.1}MnO₃"; during 88th Indian Science Congress; IARI, New Delhi, 3rd -7th January, 2001.
- "Transport and other properties of some colossal magneto-resistive materials" in 45th DAE-Solid State Physics Symposium, held at Panjab University, Chandigarh; 26th -30th December, 2002.
- "Electron Microscopy of Precipitate Phase in Cold – Worked and Aged Titanium Modified Austenitic Stainless Steel", at 27th Electron Microscope Society of India [EMSI] Conference, National Physical Laboratory, New Delhi; 29th -31st March, 2004.
- "Transport anomalies in Bi_{0.96}Sb_{0.04} across the quantum limit"; at *Miniworkshop on Strong Correlations in Materials and Atom traps*, at ICTP, Trieste, Italy during 4th - 15th August, 2008.

- "Thermoelectric materials: Basic introduction, Present status and recent developments"; Invited talk at *Frontiers of Physics: An Exchange of Ideas On Emerging Directions-A two-day research seminar under the SUN programme* held at University of Burdwan during 5th-6th June, 2013.
- "Temperature-dependent structural and thermoelectric property study of Bi-Sb alloy based thermoelectric materials"; Oral talk at *Advances in Nanomaterials using Synchrotron Techniques (ANST-2014)* held at Saha Institute of Nuclear Physics, Kolkata during 11th-13th December, 2014.
- "Optimisation of thermoelectric properties by tuning the carrier concentration in Se doped Sb₂Te₃ system", Invited talk at *National Thematic Workshop on Recent Advances in Materials Science*, Organized by UGC DAE Consortium for Scientific Research, Kolkata Centre & Department of Physics, University of Burdwan, held at University of Burdwan, Burdwan, West Bengal during 8th-9th March, 2016.
- "Sb₂Te₃ Based Thermoelectric Materials: Study of Thermoelectric Property and Phonon Anharmonicity", Invited talk at *Discussion Meeting on Synchrotron Techniques in Materials Research*, Organized by: Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore & Saha Institute of Nuclear Physics, Kolkata, Sponsored by: Nanomission, DST, Govt. of India, Held at Sinclairs Retreat, Chalsa, Dooars, West Bengal during February 2-5, 2017.
- "Powder diffraction and other synchrotron based experiments on thermoelectric materials" Invited talk at *Discussion meeting on Synchrotron Science*, under the aegis of the Nano Mission project of the DST, Govt of India, held at SINP, Kolkata during December 13-15, 2017.
- "Thermoelectric composites: The case study of Bi₂Te₃+graphite nanocomposite system" Invited talk at *India-UK Workshop on Thermoelectric Materials for Waste-Heat Harvesting*, held at JNCASR, Bengaluru during January 8-10, 2018.
- "Structural and Thermoelectric Property of Bi₂Te₃/graphite Nanocomposite" Invited talk at *Users meeting of Indian Beamline, Photon Factory, KEK, Japan*, held at JNCASR, Bangalore during September 25-26, 2018.
- "Solution to today's energy challenge: Thermoelectric material-Characterization and recent results on Bi₂Te₃/Graphite nanocomposite system" Invited talk at *2nd National Symposium on Recent Trends in Instrumentation Science & Technology (NSRTIST-2019)*, Organized by Dept. of Instrumentation Science, Jadavpur University, Kolkata on January 18, 2019.
- "Tuning of Thermoelectric Performance by Modulating Lattice Thermal Conductivity in Pnictide Chalcogenides based Nanocomposite" Invited talk at *64th DAE Solid State Physics Symposium (DAE SSPTS-2019)* held at IIT Jodhpur, Rajasthan, Organized by Dept. of Atomic Energy, Govt. of India during December 18-22, 2019.
- "Tuning of Thermoelectric Performance by Modulating Lattice Thermal Conductivity in Sb₂Te₃ based Nanocomposite samples" Invited talk in 11th Vidyasagar-Satyendra Nath Bose National Workshop on *Physics of Novel Functional Materials (PNFM-2020)* at Vidyasagar University, Midnapore, West Bengal on 9th January, 2020.
- "Manipulation of lattice thermal conductivity in Sb₂Te₃/graphite nanocomposite thermoelectrics" Invited talk in webinar *Emerging Trends in Chemical and Material Science*, organized by Gokhale Memorial Girls' College, Kolkata during June 28-29, 2020.

RESEARCH EXPERIENCE:

➤ **During Ph.D:**

Topic of research:

Magnetic field dependent transport properties of perovskite oxides of colossal magneto-resistive materials.

• **Systems Studied:**

- LaMnO_{3+δ}
- La_{1-x}Pb_xMnO₃ (0.0 ≤ x ≤ 0.5)
- La_{0.5}Pb_{0.5}MnO₃ (With three different grain size)
- La_{0.5}Pb_{0.5}Mn_{1-y}Cr_yO₃ (0.0 ≤ y ≤ 0.45)

• **Characterization:**

- X-Ray Diffraction.
- Temperature variation of resistivity under magnetic field.

- c. Magnetic field dependent temperature variation of thermoelectric power
- d. Thermal variation of Hall Coefficient in different magnetic field.
- e. Defect induced (by heavy ion beam irradiation) study.

- **Instrumental setup made:**

- a. Thermoelectric power setup used for characterization as mentioned above.
- b. Hall effect setup used for characterization as mentioned above.

- **Main Results:**

My thesis work deals with the measurement and analysis of magnetic field dependent resistivity and thermoelectric power. I've also measured the thermal variation of Hall coefficient of several CMR samples. From the resistivity data

- We have found for the first time that the high temperature semiconducting regime (above metal-insulator transition temperature T_p) of the resistivity data can be divided into two distinct regions. The higher part (above $\theta_D/2$) is well fitted with Small Polaron Hopping (SPH) model, but the region between T_p and $\theta_D/2$ was found to be dominated by Variable Range Hopping (VRH) mechanism.
- Appearance of semiconductor to metal transition is accompanied by a change from non-adiabatic to adiabatic hopping conduction.
- A change from non-adiabatic (for $T > \theta_D/2$) to adiabatic (for $T < \theta_D/2$) hopping conduction mechanism takes place in LaMnO_3 , showing no metal-insulator transition.
- It is observed that, above T_p , the temperature range for SPH increases and VRH decreases with increasing grain size.
- Electron magnon scattering dominates the low temperature metallic region.

Thermal variation of Magnetic field dependent thermoelectric power data shows interesting results.

- Like resistivity, signature of electron-magnon scattering has also been confirmed from low temperature thermopower analysis.
- The high temperature region was found to be dominated by SPH mechanism.
- No signature of VRH model is obtained from the thermopower data, since thermopower between grain to grain is additive in nature.
- Thermoelectric power is less sensitive to grain size.
- It was found that polaronic radius increases with magnetic field.

Very few works have been done on the Hall coefficient measurements on CMR materials. From our measurements

- We have found that the high temperature regime is dominated by SPH model, with activation energy is 2/3 of that obtained from resistivity data, which confirmed that adiabatic SPH model controls the high temperature regime.
- The high temperature Hall coefficient was found to be negative, which confirms that the charge carriers in this region is electronic polaron.
- Thermal variation of Hall mobility also shows interesting behavior.

- **After Ph.D:**

- **Indira Gandhi Center for Atomic Research, Kalpakkam, India:**

- **Topic of research:**

Structural, micro-structural characterization and thermophysical property studies of some materials related to fast reactor.

- **Characterization:**

- a. High temperature X-Ray Diffraction.
- b. Tunneling electron microscopy (TEM).
- c. Scanning electron microscope (SEM).
- d. Energy dispersive X-Ray spectroscopy (EDX).
- e. Electron Microprobe Analysis (EPMA).
- f. High temperature calorimetry.

- **Laboratoire Photons Et Matière, UPR 5 –CNRS, E.S.P.C.I, Paris, France :**

Topic of research:

Study of magneto-transport property (down to 100 mK and upto 12T magnetic field) of $\text{Bi}_x\text{Sb}_{1-x}$ family of systems, which are host to high-mobility *Dirac electrons* with interesting thermoelectric behaviour. Intensively involved in the study of the Nernst response across the quantum limit in this family.

- **Department of Physics, University of Calcutta, Kolkata, India:**

Topic of research:

In broader sense, presently I'm interested to study the *bewildering variety of transport and other physical phenomena observed in strongly correlated electron systems*.

At University of Calcutta, I'm now involved in the following research areas of Materials Science:

- ✓ Synthesis and Characterization of ZnO based dilute magnetic semiconductor.
- ✓ Synthesis and in depth characterization of different thermoelectric materials

- **Characterization:**

- a. Room temperature X-Ray Diffraction for phase identification.
- b. Low temperature transport property (resistivity, thermopower etc.) measurement down to 10 K, using closed cycle cryostat.
- c. Magneto-transport viz., magnetoresistance, Hall effect etc. study (in collaboration).
- d. Magnetic measurement using SQUID VSM magnetometer.

List of Publication:

Book/Review article:

- 1) 'Manganite Nanocomposite': B. K. Chaudhuri, **Aritra Banerjee** and Sudipta Pal [Ed.: H. S. Nalwa]; "Encyclopedia of Nanoscience and Nanotechnology" Volume 5; pp: 41-52, American Scientific Publishers, California, USA (2004) [ISBN: 1-58883-001-2]
- 2) 'Ion Beam Induced Modification of ZnO-Based Dilute Magnetic Semiconductor': S. K. Neogi, **A. Banerjee** and Sudipta Bandyopadhyay [Ed.: Boris I. Kharisov, Oxana V. Kharissova, Ubaldo Ortiz Mendez]; "Radiation Synthesis of Materials and Compounds", pp: 113-146, CRC Press, Taylor and Francis Group, Boca Raton, USA (2013) [ISBN: 978-1-4665-0522-3].
- 3) Review article published in the Journal *Current Physical Chemistry*, Bentham Science Publisher: 'Transition Metal Doped ZnO as a Host of Dilute Magnetic Semiconductor': Swarup K. Neogi, **Aritra Banerjee** and Sudipta Bandyopadhyay, *Current Physical Chemistry* 3, 333-356 (2013).
- 4) 'Physical Properties of Dilute Magnetic Semiconducting Oxides: Defect induced intrinsic ferromagnetism in powder and thin films of zinc oxide': Sudipta Bandyopadhyay, Swarup Kumar Neogi, **Aritra Banerjee**, LAP Lambert Academic Publishing (2014) [ISBN-13: 978-3-659-65856-5, ISBN-10: 3659638560].

Journal Papers:

- 1) Positron annihilation studies on $\text{La}_{1-x}\text{Pb}_x\text{MnO}_3$ system; **A Banerjee**, B K Chaudhuri, A Sarkar, D Sanyal and D Banerjee; *Physica B* 299/1-2, 130-134, (2001).
- 2) Polaron hopping conduction and thermoelectric power in $\text{LaMnO}_{3+\delta}$; Sudipto Pal, **Aritra Banerjee**, E Rozenberg, and B K Chaudhuri; *Journal of Applied Physics* 89, 4955-4961, (2001).
- 3) Nature of small polaron hopping conduction and the effect of Cr doping on the transport properties of rare-earth manganite $\text{La}_{0.5}\text{Pb}_{0.5}\text{Mn}_{1-x}\text{Cr}_x\text{O}_3$; **Aritra Banerjee**, S Pal, and B. K. Chaudhuri; *J. Chemical Physics* 115, 1550-1559, (2001).
- 4) Magnetoresistance and magnetothermoelectric power of $\text{La}_{0.5}\text{Pb}_{0.5}\text{Mn}_{1-x}\text{Cr}_x\text{O}_3$; **Aritra Banerjee**, S. Pal, S. Bhattacharya, H. D. Yang and B K Chaudhuri; *Phys. Rev. B* 64, 104428-7 pages, (2001).
- 5) Adiabatic and non-adiabatic small polaron hopping conduction in $\text{La}_{1-x}\text{Pb}_x\text{MnO}_{3+\delta}$ ($0.0 \geq x \geq 0.5$) type oxides above the metal-semiconductor transition; **Aritra Banerjee**, Sudipta Pal, E Rozenberg and B K Chaudhuri; *J. Phys.: Condens. Matter* 13, 9489-9504, (2001).
- 6) Adiabatic and non-adiabatic hopping conduction in La-Pb-Mn-O type system; **A. Banerjee***, S.Pal, E. Rozenberg and B. K. Chaudhuri; *Journal of Alloys and Compounds* 326/1-2, 85-88, (2001).
- 7) Effect of Cr doping on the transport properties of $\text{La}_{0.5}\text{Pb}_{0.5}\text{Mn}_{1-x}\text{Cr}_x\text{O}_3$; **Aritra Banerjee**, B K Chaudhuri and E Rozenberg; *Indian Journal of Physics* 75A, 475-477, (2001).
- 8) Particle size and magnetic field dependent resistivity and thermoelectric power of $\text{La}_{0.5}\text{Pb}_{0.5}\text{MnO}_3$ above and below metal-insulator transition; **Aritra Banerjee**, S. Pal, S. Bhattacharya, H. D. Yang and B.K Chaudhuri; *Journal of Applied Physics* 91, 5125-5234, (2002).
- 9) Transport properties of Na doped $\text{La}_{1-x}\text{Ca}_x\text{Na}_y\text{MnO}_3$ measured in pulsed magnetic field; Sayani Bhattacharya, **Aritra Banerjee**, S. Pal, R. K. Mukherjee, P. Chatterjee, B. K. Chaudhuri; *J. Phys.: Condens. Matter* 14, 10221-10235, (2002).
- 10) Positron annihilation lifetime studies on $\text{La}_{0.5}\text{Pb}_{0.5}\text{Mn}_{1-y}\text{Cr}_y\text{O}_3$; **Aritra Banerjee**, A. Sarkar, D. Sanyal, P. Chatterjee, D. Banerjee and B. K. Chaudhuri; *Solid State Communication* 125/1, 65-70, (2003).
- 11) Thermoelectric power of Na doped $\text{La}_{0.7}\text{Ca}_{0.3-y}\text{Na}_y\text{MnO}_3$ system both in presence and in absence of magnetic field; S. Bhattacharya, **Aritra Banerjee**, S. Pal, R. K. Mukherjee, B. K. Chaudhuri; *Journal of Applied Physics* 93, 356-361, (2003).

- 12) Evidence of non-adiabatic small polaron hopping conduction in $\text{Bi}_{0.1}\text{A}_{0.9}\text{MnO}_3$ (A=Ca, Sr, Pb); Sudipta Pal, **Aritra Banerjee**, P. Chatterjee and B K Chaudhuri *Phys. Stat. Solidi* **237**, 513-522, (2003).
- 13) Study of magnetization and transport properties in $\text{La}_{0.7}\text{Pb}_{0.3}\text{MnO}_3$ with the addition of nonmagnetic Ag; Sudipta Pal, **Aritra Banerjee**, B.K. Chaudhuri, *Journal of Physics and Chemistry of Solids* **64**, 2063–2067, (2003).
- 14) Magnetotransport properties of alkali metal doped La-Ca-Mn-O system under pulsed magnetic field: Decrease of small polaron coupling constant and melting of polarons in the high temperature phase; Sayani Bhattacharya, S Pal, **Aritra Banerjee**, H D Yang and B K Chaudhuri; *J. Chemical Physics* **119**, 3972-3982, (2003).
- 15) Study of 50 MeV Li^{3+} irradiation induced changes in $\text{La}_{0.7}\text{Pb}_{0.3}\text{MnO}_3$ system; S Chattopadhyay, **Aritra Banerjee**, A Sarkar, Ravi Kumar, B K Chaudhuri and D Banerjee; *Radiation Measurements* **36**, 689-693, (2003).
- 16) Transport and magnetic properties of $\text{La}_{0.7}\text{Pb}_{0.3}\text{MnO}_3 + x \text{Ag}$ ($x=0-20\text{wt}\%$) nanocomposites; Sudipta Pal, **Aritra Banerjee**, S Chatterjee, A.K.Nigam, B.K.Chaudhuri and H D Yang; *Journal of Applied Physics* **94**, 3485-3491, (2003).
- 17) Comments on “Evidence for the immobile bipolaron formation in the paramagnetic state of the magnetoresistive manganites”; **Aritra Banerjee**, S Bhattacharya, S Mollah, H. Sakata, H D Yang, and B K Chaudhuri; *Phys. Rev. B* **68**, 186401-5 pages, (2003).
- 18) Thermal expansion studies on Inconel – 600® by high temperature X- Ray diffraction; S. Raju, K. Sivasubramanian, R. Divakar, G. Panneerselvam, **Aritra Banerjee**, E. Mohandas and M. P. Antony, *J. Nuclear Materials* **325**, 18-25, (2004).
- 19) Effect of Li^{3+} irradiation on the transport properties of $\text{La}_{0.7}\text{Pb}_{0.3}\text{MnO}_3$ type CMR material; S. Chattopadhyay, A. Sarkar, A. Banerjee, S. Karmakar, D. Banerjee, R. Kumar, B.K. Chaudhuri, *Nuclear Instruments and Methods in Physics Research (Section B)* **226**, 274–280, (2004).
- 20) Enthalpy Measurements on a Titanium Modified Austenitic Stainless Steel; **Aritra Banerjee**, S Raju, R Divakar and E Mohandas, *Materials letter* **59**, 1219-1222, (2005).
- 21) Thermal Property Characterisation of a Titanium Modified Austenitic Stainless Steel (Alloy - D9); **Aritra Banerjee**, S Raju, R Divakar, E Mohandas, G Panneerselvam and M P Antony, *Journal of Nuclear Materials* **347**, 20-30, (2005).
- 22) A study on the thermal expansion characteristics of a dissimilar fusion joint by high temperature X-ray Diffraction; **Aritra Banerjee**, S Raju, R Divakar, E Mohandas, C Sudha, A L E Terrance, P Parameswaran, G Panneerselvam and M P Antony, *Materials Letter* **60**, 1527-1532, (2006).
- 23) High temperature heat capacity of Alloy D9 using drop calorimetry enthalpy increment measurements, **Aritra Banerjee**, S Raju, R Divakar, E Mohandas, *International Journal of Thermophysics* **28**, 97-108, (2007)
- 24) Development of Joining Procedure for Pole Pieces of Electromagnet of Diverse Safety Rod in Fast Breeder Reactor; H.C. Dey, V. Shankar, R. Vijayashree, P. Sivaraman and **A. Banerjee**, *International Journal of Nuclear Energy Science and Technology* **3**, 76-87, (2007).
- 25) Characterisation of thermal stability and phase transformation energetics in tempered 9Cr-1Mo steel using drop and differential scanning calorimetry, S. Raju, B. Jeya Ganesh, **Aritra Banerjee** and E. Mohandas, *Materials Science & Engineering A* **465**, 29-37, (2007).
- 26) Transport anomalies in $\text{Bi}_{0.96}\text{Sb}_{0.04}$ across the quantum limit, **Aritra Banerjee**, Benoit Fauque, Koichi Izawa, Atsushi Miyake, Ilya Sheikin, Jacques Flouquet, Bertrand Lenoir and Kamran Behnia, *Physical Review B (Rapid Communication)*, Selected as **Editors Suggestion** **78**, 161103 (R), (2008).
[Also highlighted as synopsis in ‘PHYSICS’ of American Physical Society:
<http://physics.aps.org/synopsis-for/10.1103/PhysRevB.78.161103>]

- 27) Synthesis and characterization of single phase Mn doped ZnO, S. Chattopadhyay, S. Dutta, **A. Banerjee**, D. Jana, S. Bandyopadhyay, S. Chattopadhyay, A. Sarkar, *Physica B* **404**, 1509-1514, (2009).
(Arxiv: Cond-mat: **0901.0807**)
- 28) Defects induced ferromagnetism in Mn doped ZnO, S. Chattopadhyay, S. K. Neogi, A. Sarkar, M. D. Mukadam, S. M. Yusuf, **A. Banerjee**, S. Bandyopadhyay, *J. Magn. Magn. Matt.* **323**, 363 (2011).
(Arxiv: Cond-mat: **1010.0547**)
- 29) Na₂Cd₂L₆(H₂O)₆ [L=Urotropine]: An interesting precursor for synthesizing CdO particles, Sandip Mondal, Tanmay Chattopadhyay, Swarup Kumar Neogi, Totan Ghosh, **Aritra Banerjee**, Debasis Das, *Materials Letters* **65**, 783 (2011).
- 30) Nernst quantum oscillations in bulk semi-metals, Zengwei Zhu, Huan Yang, **Aritra Banerjee**, Liam Malone, Benoit Fauque and Kamran Behnia, *J. Phys.: Condens. Matter* **23**, 094204 (2011).
- 31) Effect of 50 MeV Li³⁺ irradiation on structural and electrical properties of Mn doped ZnO, S. K. Neogi, S. Chattopadhyay, Aritra Banerjee, S. Bandyopadhyay, A. Sarkar and Ravi Kumar, *J. Phys.: Condens. Matter* **23**, 205801 (2011).
- 32) Paramagnetic and anti-ferromagnetic interactions in sol-gel derived Zn_{1-x}Mn_xO [50 MeV Li³⁺ irradiated (x=0.04) and unirradiated (x=0.02 and 0.04)] samples, S. K. Neogi, R. Karmakar, **A. Banerjee**, S. Bandyopadhyay, Ravi Kumar, Alok Banerjee, A. Mallik and T. P. Sinha, *Radiation Effects and Defects in Solids* **166**, 675 (2011).
- 33) Absence of ferromagnetism in Mn Doped ZnO, R. Karmakar, S.K. Neogi, **A. Banerjee**, S. Bandyopadhyay, Alok Banerjee, A. Mallik and P.K. Maity, *AIP Conf. Proc.* **1347**, 206 (2011).
- 34) Role of nano size particle assembly In ferromagnetism of Mn doped ZnO pellets, S. K. Neogi, S. Chattopadhyay, R. Karmakar, **A. Banerjee**, S. Bandyopadhyay, Alok Banerjee, *AIP Conf. Proc.* **1347**, 289 (2011).
- 35) Effect of Mn doping on structural and optical properties of Zn_{1-x}Mn_xO thin films, R. Karmakar, S. K. Neogi, S. Bandyopadhyay and **Aritra Banerjee**, *AIP Conf. Proc.* **1447**, 1075 (2012).
- 36) Role of Milling Time for Ferromagnetic Mn Doped ZnO Samples, S. Chattopadhyay, R. Karmakar, S. K. Neogi, **A. Banerjee**, S. Bandyopadhyay, M. D. Mukadam and S. M. Yusuf, *AIP Conf. Proc.* **1447**, 1195 (2012).
- 37) Sb concentration dependent structural and resistive properties of polycrystalline Bi-Sb alloys, K. Malik, Diptasikha Das, D. Mondal, D. Chattopadhyay, A. K. Deb, S. Bandyopadhyay and **Aritra Banerjee**, *J. Applied Physics* **112**, 083706 (2012).
- 38) Structural; morphological; optical and magnetic properties of Mn doped ferromagnetic ZnO thin film, R. Karmakar, S.K. Neogi, **Aritra Banerjee**, S. Bandyopadhyay, *Applied Surface Science* **263**, 671 (2012).
- 39) Sb Concentration Dependent Power Factor of n-type Thermoelectric Material Bi_{1-x}Sb_x Alloy, K. Malik, Diptasika Das, A K Deb, S. Bandyopadhyay and **Aritra Banerjee**, *AIP Conf. Proc.* **1512**, 980 (2013).
- 40) Structural modification by Li³⁺ ion irradiation and intrinsic magnetic properties of un-irradiated and Li³⁺ irradiated Zn_{0.96}Mn_{0.04}O samples, S.K. Neogi, S. Chattopadhyay, R. Karmakar, **Aritra Banerjee**, S. Bandyopadhyay, A. Banerjee, *J. Alloys and Compound* **573**, 76 (2013).
- 41) Physical properties of antiferromagnetic Mn doped ZnO samples: Role of impurity phase, S.K. Neogi, R. Karmakar, A.K. Misra, **A. Banerjee**, D. Das, S. Bandyopadhyay, *J. Magn. Magn. Matt.* **346**, 130 (2013).
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- 26) *Sb concentration dependent structural and resistive properties of polycrystalline Bi-Sb alloys: The proposal for low temperature powder diffraction measurement*, K. Malik, Diptasikha Das, S. bandyopadhyay and **Aritra Banerjee**, '12th International Conference on Surface X-Ray and Neutron Scattering'-Organized by: Saha institute of Nuclear Physics, Kolkata, India, July 25-28, 2012.
- 27) *Sb Concentration Dependent Power Factor of n-type Thermoelectric Material Bi_{1-x}Sb_x Alloy*, K. Malik, Diptasika Das, A K Deb, S. Bandyopadhyay and **Aritra Banerjee**, 'DAE-Solid State Physics Symposium 2012'-Organized by: BARC, Mumbai, India; held at IIT Bombay, Mumbai, India, December 3-7, 2012.
- 28) *Thermoelectic materials: Basic introduction, Present status and recent developments*; **Aritra Banerjee (Invited talk)**, 'Frontiers of Physics: An Exchange of Ideas On Emerging Directions'-A two-day research seminar under the SUN programme, University of Burdwan, June 5-6, 2013.
- 29) *Role of electron-electron and electron-phonon scattering coefficient on the enhancement of Power factor of Bi-Sb alloy*, Diptasikha Das, K. Malik, S. Bandyopadhyay and **Aritra Banerjee**, 'National Conference on CMDAYS-2013'-Held at NIT, Rourkela, August 29-31, 2013.
- 30) *Resistive and magnetic property of melt quenched Bi_{0.88}Sb_{0.12} alloys*, K. Malik, Diptasikha Das, A K Deb, S. Bandyopadhyay and Aritra Banerjee, 'National Conference on CMDAYS-2013'-Held at NIT, Rourkela, August 29-31, 2013.
- 31) *Temperature dependent powder diffraction study of Bi_{1-x}Sb_x alloy using synchrotron source*, A. K. Deb, K. Malik, Diptasikha Das, S. Bandyopadhyay and **Aritra Banerjee** & *Evaluation of power factor and linear thermal expansion coefficient of n-type thermoelectric Bi_{0.90}Sb_{0.10} and Bi_{0.86}Sb_{0.14} alloy*, Diptasikha Das, K. Malik, S. Bandyopadhyay, P. Mandal, A. K. Deb and **Aritra Banerjee** presented in 'National Workshop on Application of Radiation in Physical, Chemical and Life Sciences'-Organized by: UGC-DAE Consortium for Scientific Research, Kolkata Centre & Centre for Research in Nanoscience & Nanotechnology, University of Calcutta, Held at Technology Campus, University of Calcutta, Salt lake, Kolkata, September 4-6, 2013.
- 32) Attended 'First users' meeting of the Indian Beamline at Photon Factory, KEK, Japan" and presented poster based on the work carried out at Indian Beamline (BL-18B) Photon Factory, KEK, Japan during November-2012 beam time; - Organized by: Saha institute of Nuclear Physics, Kolkata, India, October 7-8, 2013.
- 33) Attended (on Invitation) 'Indo-French Physics Conference on Optics, Nano Sciences, Cold Atoms and Synchrotron facilities' at IISc, Bangalore-Organized by: CEFIPRA, New Delhi, during March 18-21, 2014.
- 34) Organized (Co-convener) and attended 'National Conference on Condensed Matter Days' held at Centre for Research in Nanoscience & Nanotechnology, University of Calcutta, Salktake, Kolkata -Jointly organized by Dept. of Physics, University of Calcutta and Centre for Research in Nanoscience & Nanotechnology, University of Calcutta, during August 27-29, 2014.
- 35) Attended 'National Conference on Nanoscience & Nanotechnology (NS&NT-2014)' held at Centre for Research in Nanoscience & Nanotechnology, University of Calcutta, Salktake, Kolkata - Organized by Centre for Research in Nanoscience & Nanotechnology, University of Calcutta, during September 18-19, 2014.
- 36) *Temperature-dependent structural and thermoelectric property study of Bi-Sb alloy based thermoelectric materials*, **Aritra Banerjee (Oral Talk)**, 'Advances in Nanomaterials using Synchrotron Techniques (ANST-2014)'-Held at Saha Institute of Nuclear Physics, Kolkata, December 11-13, 2014.
- 37) *Evidence for Iso-structural phase transition in Bi_{0.90}Sb_{0.10} alloy*, K. Malik, Diptasikha Das, S. Bandyopadhyay, A K Deb, and **Aritra Banerjee**, 'Discussion Meeting on the Science Using X-ray Free Electron Laser and Users meeting', under the aegis of the Nano Mission project of the DST, Govt of India, held at JNCASR, Bengaluru during February 25-26, 2016.
- 38) *Optimisation of thermoelectric properties by tuning the carrier concentration in Se doped Sb₂Te₃ system*, **Aritra Banerjee (Invited talk)**, 'National Thematic Workshop on Recent Advances in Materials Science', Organized by: UGC DAE Consortium for Scientific Research, Kolkata Centre & Department of Physics, University of Burdwan, held at University of Burdwan, Burdwan, West Bengal during March 8-9, 2016.
- 39) *Sb₂Te₃ Based Thermoelectric Materials: Study of Thermoelectric Property and Phonon Anharmonicity*, **Aritra Banerjee (Invited talk)**, 'Discussion Meeting on Synchrotron Techniques in Materials Research',

Organized by: JNCASR, Bengaluru & SINP, Kolkata, Sponsored by: Nanomission, DST, Govt. of India, held at Sinclairs Retreat, Chalsa, Dooars, West Bengal during February 2-5, 2017.

- 40) *Powder diffraction and other synchrotron based experiments on thermoelectric materials*: **Aritra Banerjee (Invited Talk)**, 'Discussion meeting on Synchrotron Science', under the aegis of the Nano Mission project of the DST, Govt of India, held at SINP, Kolkata during December 13-15, 2017.
- 41) *Thermoelectric composites: The case study of Bi_2Te_3 +graphite nanocomposite system*: **Aritra Banerjee (Invited Talk)**, 'India-UK Workshop on Thermoelectric Materials for Waste-Heat Harvesting', held at JNCASR, Bengaluru during January 8-10, 2018.
- 42) *Structural and Thermoelectric Property of Bi_2Te_3 /graphite Nanocomposite*: **Aritra Banerjee (Invited Talk)**, 'Users meeting of Indian Beamline, Photon Factory, KEK, Japan' held at JNCASR, Bangalore during September 25-26, 2018.
- 43) *Solution to today's energy challenge: Thermoelectric material-Characterization and recent results on Bi_2Te_3 /Graphite nanocomposite system*: **Aritra Banerjee (Invited talk)**, '2nd National Symposium on Recent Trends in Instrumentation Science & Technology (NSRTIST-2019)', Organized by Dept. of Instrumentation Science, Jadavpur University, Kolkata on January 18, 2019
- 44) *Tuning of Thermoelectric Performance by Modulating Lattice Thermal Conductivity in Pnictide Chalcogenides based Nanocomposite*: **Aritra Banerjee (Invited talk)**, '64th DAE Solid State Physics Symposium (DAE SSPS-2019)'; held at IIT Jodhpur, Rajasthan, Organized by Dept. of Atomic Energy, Govt. of India during December 18-22, 2019.
- 45) *Tuning of Thermoelectric Performance by Modulating Lattice Thermal Conductivity in Sb_2Te_3 based Nanocomposite samples*: **Aritra Banerjee (Invited talk)**, '11th Vidyasagar-Satyendra Nath Bose National Workshop on Physics of Novel Functional Materials (PNFM-2020)' held at Vidyasagar University, Midnapore, West Bengal during January 8-10, 2020.