



Dr. Debamalya Banerjee

Assistant Professor, Department of Physics,
IIT Kharagpur, India
(2013 - Present)

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Research profile: My current research area involves electrical characterization of organic polymer based thin films and electron paramagnetic resonance (EPR). Previously I worked on spin dynamics in inorganic radicals, distance measurements in labeled proteins, investigations of structural dynamics in amorphous and supercooled phases of aqueous systems and dynamic nuclear polarization (DNP). My PhD was about supercooled liquid dynamics and glass transition. In future, I want to conduct ESR investigations on interfacial water and on materials important for semiconductor and photovoltaic application.

Education:

Doctoral research <i>Thesis Title:</i> Phase transitions and relaxation processes in water, glycerol and glycerol-water binary liquid mixtures: Spin probe ESR studies	Department of Physics, Indian Institute Science, Bangalore 560012, India	2003 – 2009
M. Sc. in Physics <i>Master thesis Title:</i> Optical and conducting properties of silicon nanowire and nanocrystalline diamond Short term Projects completed in MS: <ul style="list-style-type: none"> ➤ “Structures formed by non-stoichiometric silicon compounds: A MD simulation study” ➤ “Motion of symmetric top: An application of 2nd order Runge-Kutta algorithm” 	Indian Institute of Technology, Kanpur, India	2001 – 2003
B. Sc. (with honors/major in Physics)	University of Calcutta, India	1998 – 2001

Post-doctoral research:

MPI CEC (Mulheim, NRW, Germany) Project titles: <ul style="list-style-type: none"> ➤ Configuration and ligand binding mechanism of HydG enzyme in anaerobic [FeFe]-hydrogenase with advanced pulsed ESR techniques ➤ Solvent effect on spin interactions of Diphenylcarbene (DPC) with pulsed EPR 	MPI for Chemical Energy Conversion, Mülheim an der Ruhr, Germany	2012 - 2013
Weizmann Institute of Science (Rehovot, Israel) Project titles: <ul style="list-style-type: none"> ➤ Measurement of nanometer-range distances between transition ion tags bound to specific protein sites ➤ Heteronuclear assisted polarization transfer in a new perchlorinated DNP polarizing agents used for ¹³C DNP ➤ Mechanistic study of ¹³C DNP on model systems with a homebuilt 95 GHz/36.2 MHz DNP Spectrometer 	Department of Physical Chemistry, Weizmann Institute of Science, Rehovot, Israel	2009 - 2012

Awards and honors:

- DST-INSPIRE faculty fellowship (2013)
- Dean of Science postdoctoral fellowship at Weizmann Institute of Science (2010)
- CSIR/UGC junior research fellowship for doctoral studies through National Eligibility Test (2003)

Selected Publications:

1. **The Interplay between the Solid Effect and the Cross Effect Mechanism in Solid State ^{13}C -DNP at 95 GHz using trityl radicals**, *Debamalya Banerjee, *Daphna Shimon, Yonatan Hovav, Akiva Feintuch, Daniella Goldfarb, Shimon Vega, *Journal of Magnetic Resonance* **230** 212 (2013)
*equal contribution
2. **Electron spin resonance studies of supercooled water**, Debamalya Banerjee, Subray V. Bhat and Dino Leporini, *Adv. Chem. Phys.* Volume **152** 1 (2013) (Title: 'Liquid Polymorphism', Editor: H. E. Stanley, Wiley, NY)
3. **Molecular probe dynamics reveals suppression of ice-like liquid regions in strongly confined supercooled water**, Debamalya Banerjee, S. N. Bhat, D. Leporini and S. V. Bhat, *PLoS One*, **7** e44382 (2012)
4. **Nanometer range distance measurement in a protein using Mn^{2+} tags**, Debamalya Banerjee, Hiromasa Yagi, Thomas Huber, Gottfried Otting and Daniella Goldfarb, *J. Phys. Chem. Lett.* **3** 157 (2012)
5. **Gadolinium tagging for the high precision measurement of 6 nm distance in the protein assemblies by EPR**, Hiromasa Yagi, Debamalya Banerjee, Bim Graham, Thomas Huber, Daniella Goldfarb and Gottfried Otting, *J. Am. Chem. Soc.* **133** 10418 (2011)
6. **Correlation of the EPR properties of polychlorotriphenylmethyl radicals and their efficiency as DNP polarizers**, Debamalya Banerjee, Juan Carlos Paniagua, Veronica Mugnaini, Jaume Veciana, Akiva Feintuch, Miquel Pons and Daniella Goldfarb, *Phys. Chem. Chem. Phys.* **13** 18626-18637 (2011)
7. **ESR evidence for 2 coexisting liquid phases in deeply supercooled bulk water**, Debamalya Banerjee, S. N. Bhat, D. Leporini and S. V. Bhat, *Proc. Natl. Acad. Sci. USA* **106** 11448 (2009)
8. **Vitrification, relaxation and free volume in glycerol-water binary liquid mixture: Spin probe ESR studies**, Debamalya Banerjee and S. V. Bhat, *J. Non-Cryst. Sol.* **355** 2433 (2009)
9. **Confinement in silicon nanowires: Optical properties**, S. Bhattacharya, D. Banerjee, K. W. Adu, S. Samui, and Somnath Bhattacharyya, *Appl. Phys. Lett.* **85** 2008 (2004)
10. **[FeFe]-Hydrogenase Maturation: ESEEM, HYSORE and RIDME Study of Radical-SAM Enzyme HydG from *Shewanella oneidensis***, Katrina R. Hong, Debamalya Banerjee, Agnieszka Adamska, Sigrun Rumpel, Eduard Reijerse, Nicholas Cox, Wolfgang Lubitz*, *manuscript under preparation*

Other Publications:

1. **A Dynamic Nuclear Polarization spectrometer at 95 GHz/144 MHz with EPR and NMR excitation and detection capabilities**, Akiva Feintuch, Daphna Shimon, Yonatan Hovav, Debamalya Banerjee, Ilia Kaminker, Yaacov Lipkin, Koby Zibzener, Boris Epel, Shimon Vega, Daniella Goldfarb, *J. Magn. Reson.* **209** 136 (2011)
 2. **Synthesis, Structure, and Magnetic Properties of Amine-Templated Transition-Metal Phosphites**, Padmini Ramaswamy, Sukhendu Mandal, Nayana N Hegde, Ramanath Prabhu, Debamalya Banerjee, S. V. Bhat and Srinivasan Natarajan, *Eur. J. of Inorg. Chem.* **2010** 1829 (2010)
 3. **Spin Probe ESR Studies of Nanocomposite Polymer Electrolytes**, Madhurjya M. Borgohain, D. Banerjee, L. Korecz and S. V. Bhat, *Appl. Magn. Reson.* **36** 149 (2009)
 4. **Fluorite and Mixed-Metal Kagome Related Topologies in Metal-Organic Frameworks Compounds: Synthesis, Structure and Properties**, Partha Mahata, Rajmani Raghunathan, Debamalya Banerjee, Diptiman Sen, S. Ramasesha, S. V. Bhat and Srinivasan Natarajan, *Chem. Asian J.* **4** 936 (2009)
 5. **Synthesis, Structure, and Magnetic Properties of a New Three-Dimensional Iron Phosphite, $[\text{C}_4\text{N}_2\text{H}_{12}][\text{Fe}_4(\text{H}_2\text{O})_3(\text{HPO}_3)_7](\text{H}_2\text{O})_x$, $x = 0.6$** , Sukhendu Mandal, Debamalya Banerjee, S. V. Bhat, Swapan K. Pati and Srinivas Natarajan, *Eur. J. of Inorg. Chem.* **2008** 1386 (2008)
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