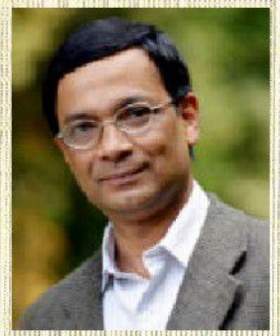
Brief Biography of Professor D. D. Sarma



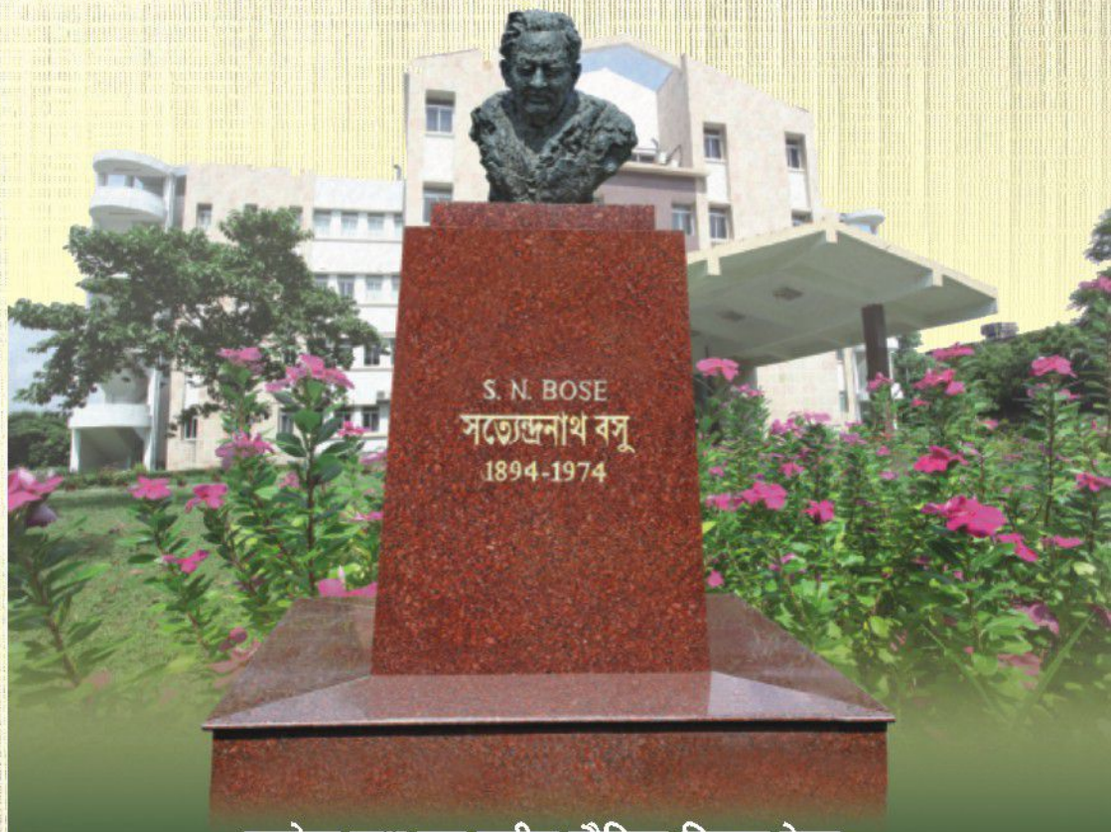
D. D. Sarma obtained a 5-year Intergrated MSc degree in Physics from Indian Institute of Technology, Kanpur in 1977 and a Ph.D. Degree in 1982 from Indian Institute of Science (IISc), Bangalore. He worked in Kernforschungsanlage, Jülich, Germany, as a Visiting Scientist during 1984-1986. Since 1986, he has been a faculty member at Solid State and Structural Chemistry Unit of IISc and currently holds the J. N. Tata Chair of IISc. His research interest spans the science of strongly correlated electron systems, primarily based on transition metal compounds, and semiconductor nanocrystals using a wide range of experimental as well as theoretical tools. He has published more than 450 scientific papers and holds several patents. He is an elected Fellow of all three Science Academies and the Engineering Academy in India and The World Academy of Sciences (TWAS) and American Physical Society. He has received many national and international awards and recognitions, including multiple Honoris Causa Doctorate degrees. He has held a number of academic positions outside of his parent organisation (IISc), including many Honorary/Guest/Visiting Professorships, such as University Professor of "Computational Material Physics", University of Vienna (May 2017), Guest Professor of Physics, Uppsala University (2011-2016),Visiting Professor at Department of Complexity Science and Engineering, University of Tokyo (2001-2002), Distinguished Scientist of CSIR (2011-2016), MLS Chair Professor at IACS (2006-2009), Adjunct Professor at TIFR (2003-2009 and 2011-2014), Honorary Professor at JNCASR (2003-to date) and SNBNCBS (2014-2020), and Distinguished Visiting Professor (2009-2014) and Eminent Visiting Fellow (2018-2023) at IACS.Further details can be found on his group webpage (http://sscu.iisc.ac.in/people/DDSarma/).

BOSE-125 Distinguished Lecture

on

SEVENTH SEPTEMBER
2018

सत्येन्द्र नाथ बसु की 125 वीं जयंती



सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र

Satyendra Nath Bose National Centre for Basic Sciences

A new generation of photovoltaic materials: Organic-inorganic hybrid perovskites

D.D.Sarma

ABSTRACT

It has been recently discovered that a class of materials based on organic-inorganic hybrid methyl ammonium (MA) lead halides ($MAPbX_3$, with X = I, Br, and Cl) compounds can have extraordinary photovoltaic properties, with efficiencies reaching beyond 22%. In addition, these materials also have many other attractive features, such as solution process ability. While a large part of the international effort is aimed at further improving the efficiency or to improve other technological aspects, such as the stability or to replace toxic Pb, there is also an intense effort in understanding the intrinsic properties of these compounds. Curiously enough, there does not appear to be any universally accepted understanding of even the most basic properties of these materials. For example, an intensely debated issue concerns the ability of permanent dipoles on organic moieties to give rise to polar fields, either in the normal state (as in any ferro electric material) or in the photo-excited state, contributing to its spectacular photovoltaic properties. Even estimates of the excitonic binding energy in these materials have proven to be controversial with various estimates differing by more than an order of magnitude. I shall discuss our own efforts with $MAPbX_3$ and related compounds to understand physical properties of several of these hybrid materials. We use various techniques that are differently sensitive to the polar nature of any given material, probing time-scales from the static down to a few hundred femto-seconds, both without and in presence of photo-excitation to address several outstanding issues.

This work is a result of collaborations with B Bhattacharyya, M Bokdam, C De, C Franchini, S Ghara, TN Guru Row, A Hossain, BP Kore, G Kresse, A Kumar, J Lahnsteiner, P Mahale, A Mohanty, S Mukherjee, S Pal, A Pandey, MS Pavan, S Picozzi, T Sander, Sharada G, A Stroppa, A Sundaresan, and D Swain.

S. N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES

KOLKATA

Director

and

Staff and students of S. N. Bose National Centre for Basic Sciences request the pleasure of your company at the

BOSE-125 Distinguished Lecture

by

Prof. D.D.Sarma

Solid State & Structural Chemistry ,
Indian Institute of Science, Bengaluru

on

Tuesday, 7th September, at 4:00 pm

to celebrate

125th Birth Anniversary of Professor Satyendra Nath Bose

Prof. Samit Kumar Ray
Director

Venue :
Silver Jubilee Hall
S. N. Bose National Centre for Basic Sciences
Block JD , Sector-III, Salt Lake City,
Kolkata - 700 106, India
Phone: +91-33-2335 1313/0312/3057/3061/5705/6/7/8
Web: www.bose.res.in