

Research Profile : 2012 (February)

Dr Ganguli is a solid state & materials chemist and in the last 25 years has contributed extensively on the structure and properties of a variety of complex solids, including polar intermetallic compounds, oxides, chalcogenides and pnictides. He is an expert in the synthesis and handling of the most difficult phases (other than radioactive materials). At IIT Delhi (Chemistry dept) starting from basically no infrastructure for solid state/materials research in 1995 he has created an exciting research environment .

Dr Ganguli has **pioneered the study of oxypnictide superconductors in India during 2008-2011**(nearly 20 papers and two reviews have been published by him). He found a very simple method to dope electrons and enhance superconductivity using KF/NaF (EuroPhys Letts, 2008). His work on the use of smaller ions to act as chemical pressure agents has led to the enhancement of the transition temperature, the critical field and critical current density in Ce-based oxypnictides (Appl Phys Lett 2009). In this subject his contribution from India is absolutely singular and extremely creditable, since many top laboratories in the world having experience in superconductivity could not contribute much due to the complexity and hazards associated with these phases. He has been invited to several American universities including IBM Almaden Lab, San Jose to deliver lectures on this class of superconductors. He was invited to chair and to organize the theme session on these materials in the Solid State DAE symposium in Dec 2010.

From 2003 onwards he also has a very active interest in nanostructured materials. He has **major contributions in developing microemulsion based routes to control the size/shape of metal oxide, chalcogenide and boride nanostructures**. His paper on nanostructured manganese oxides (MnO , MnO_2 and Mn_2O_3 , which are battery materials) using reverse micelles in J Mater Chem 2004 is a highly cited paper where the control of nanostructures through microemulsions was espoused and led to several papers and two reviews (Chem. Soc Rev 2010, Chem. Soc Rev 2012 (under revision)) and an Indian Patent 2011. His work on nanostructured electrocatalysts (bimetallic alloys of Fe-Co) has shown 125 times enhancement towards hydrogen evolution (J Phys Chem C 2010, J. Phys Chem C 2011). Recently he has patented a precursor method (Indian patent, 2011) for producing highly oriented nanorods of metal hexaborides for field emitter applications (J. Mater. Chem. 2012). Dr. Ganguli's contribution to controlled nanostructures using microemulsions stands out from India.

Overall Dr Ganguli has published around 170 papers in refereed international journals , 16 in conference proceedings and 6 chapters in books and has one patent. He has an H-index of 20 and total citations of around 1500. Dr Ganguli, thinks only about research , day and night and is most excited when he is in the laboratory with his students.