PhD Open Seminar

Speaker : Soumava Biswas (Ph.D Advisor: Dr. Sanjit Konar)

Topic of Seminar: Lanthanide Based Magnetic Metal-Organic Frameworks for Cryogenic Magnetocaloric Effect, Slow Magnetic Relaxation and Proton Conduction Applications

Date : 4th August, 2016

Time : 4.00 PM

Venue : AB-II (401)

Abstract

Metal–organic frameworks based on lanthanides (LnMOFs) are a very promising class of materials for addressing the various challenges in molecular magnetism and proton conduction. Basically, the construction of LnMOFs can not only lead to systematically tuned architectures, but also gives rise to multifunctional properties (e.g., molecular magnetism, proton conduction, chemical sensing, catalysis, storage *etc*). In the first chapter of this thesis, various concepts of molecular magnetism and proton conductivity are discussed briefly. The second chapter represents the syntheses, magnetocaloric effect and slow magnetic relaxation behavior of some lanthanide (Gd^{+3} and Dy^{+3}) based dense MOFs. Small carboxylic acid (e.g., Squaric acid, oxalic acid, formic acid) is used as linker to prepare those dense frameworks. Magnetic investigations confirm that gadolinium frameworks exhibits very high cryogenic magnetocaloric effects among the molecular magnetic refrigerant materials reported so far[1, 2, 3]. In the third chapter, magnetic properties of two lanthanide pamoate frameworks are thoroughly discussed. In addition, properties related to pore size and surface area of the frameworks are explored through selective sorption behavior[4]. The final chapter dealt with the rational design and synthesis of some proton conductive LnMOFs using two different carboxylic acid (cyclobutane-1,1'-dicarboxylic acid and mucic acid). The reported complexes represent the first observations of the coexistence of cryogenic magnetic refrigeration or slow magnetic relaxation and proton conduction in a single system. Also the overall work offers better understandings in the field of spin-protonics[5, 6].

References:

1. **S. Biswas**, A. Adhikary, S. Goswami and S. Konar, *Dalton Trans*., 2013, **42**, 13331
2. **S. Biswas**, A. K. Mondal and S.Konar, *Inorg. Chem*., 2016, **55**, 2085
3. **S. Biswas**, H. S. Jena, A. Adhikary, and S. Konar, *Inorg. Chem*., 2014, **53**, 3926
4. **S. Biswas**, H. S. Jena, S. Goswami, S. Sanda and S. Konar, *Cryst. Growth Des*., 2014, **12**, 1287
5. **S. Biswas,** H.S. Jena, S. Sanda and S. Konar, *Chem.- Eur. J*., 2015**, 21,** 13793
6. **S. Biswas**, V. S. Parmar, S. P. Bera and S. Konar, *submitted manuscript*.