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First-principle vs experimental design of diluted magnetic semiconductor

Semiconductors that exhibit room-temperature ferromagnetism are central to find ways to manipulate and use electronic spin to the same degree that electronic charge is used in silicon-based electronics. Diluted magnetic semiconductors (DMS) are a promising class of such materials to the development of semiconductor spintronics, but their success will depend on our ability to understand and optimize their behavior. The interface between first principle and experimental materials design could provide a way to achieve these goals. The purpose of talk is to propose some ideas to answer the most important question in material science for semiconductor spintronics, namely, how we can realize room-temperature ferromagnetism in DMS? And I will discuss the correlation between first principle and experimental design to see how we can predict the properties of yet-to-be-synthesized materials. Based on experimental design I will discuss structural and magnetic properties of some DMS materials. Based on first-principles spin-density functional calculations, the half-metallic ferromagnetic properties of some DMS materials with magnetic

impurity have been investigated. New magnetic behaviors will be discussed in DMSs recently observed as spin glass, super paramagnetic, this creates new opportunities for development and construction a new spintronics devices.

Speaker Biography

Dr. Omar Mounkachi is a researcher and project leader in the Moroccan Foundation for Advanced Science, Innovation and Research (MAScIR). He has obtained his Ph.D at University Mohammed V in collaboration with NEEL Institute (CNRS, Grenoble) in 2009. Dr. Mounkachi has more than 8 years' experience in performing and managing research within several international academic collaboration (France (CEA Grenoble (2008/2009), laue langevin institute (2010/2012)), university of Strasbourg (2015/2016), and the jean lamour institute (2014/2016), Poland (Polish Academy of Sciences (2009)), Belgium (University of Liège (2015/2016), USA (university of central florida, wake forest university (2009/2016)) and industrials cooperation (MANAGEM, OCP, PEPS, ECOMAG, SOLVAY, McPhy). He has published 100 publications in highly recognised scientific journals in several fields of condensed matter, spintronics, energy, and magnetic nanomaterials, and 16 patents. He is co-organizer of several national and international conferences. Dr. Mounkachi has been invited to give seminars in many congresses and to act as a reviewer for many scientific manuscripts from prestigious journals.

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