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Study of magnetization and critical temperature for nanomagnetic particles

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Magnetic nanostructures, such as dots and dot arrays, nanowires, multilayers and nano-junctions, are reviewed and compared with bulk magnets. By using the Gibbs free energy variational principle based on the Bogoliubov inequality the magnetic properties and critical behavior of metallic nanoparticles having concurrently atomic disorder, dilution and competing interactions, are studied within the framework of an Ising model. As a case of study we have considered the

Fe0.5 Mn0.1 Al0.4 alloy characterized for exhibiting, under bulk conditions, low temperature reentrant spin glass (RSG) behavior and for which experimental and simulation results are available. Our results allow concluding that the variational model is successful in reproducing features of the dependence of the critical temperature with particle size and low temperature magnetization reduction consistent with a RSG behavior. In this work we compute the magnetization per site and the magnetic susceptibility, as a function of temperature, for different values of the coordination number.

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Growth and band gap determination of ternary ZrSTe crystals

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We report new ternary ZrSTe crystals grown by chemical vapour transport method. Vapor transport experiments with iodine were performed on the system ZrSTe to define optimum growth conditions in terms of crystal size and surface perfection. Confirmation of stoichiometric proportion of constituent elements of grown crystals was done by Energy Dispersive Analysis of X-rays (EDAX). To find out band gap, optical absorption in ZrSTe crystals has been measured at room temperature in the spectral range 200 nm-2500 nm. From the study of two dimensions and three dimensions, it has been found that in ZrSTe, indirect transitions are allowed type and optical band gap corresponding to this transition has also been determined. Using the values obtained from optical absorption measurements optical absorption coefficient, extinction coefficient and refractive index are calculated. This finding will inspire the search for similar materials and promote an in-depth investigation of the detailed operating mechanism.

Biography

Abhay Dasadia did his MPhil in 2009 and PhD (Crystal Growth and Characterizations) in 2013 from Department Of Physics, Sardar Patel University, Vallabh Vidya nagar, Gujarat, India. Presently, he is Assistant Professor of Physics at A.D. Patel Institute of Technology, New Vallabh Vidya nagar, Gujarat, India. He has published more than 12 papers in reputed journals/proceedings and has been serving as an Editorial Board Member of reputed journal.

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