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Magnetization of ultrathin [Fe1-cNic]_n alloy nanojunctions between Fe or Co leads using an EFT-MFT model

Elie A Moujaes¹, L V Aguiar¹ and M Abou Ghantous²

¹Universidade Federal de Rondônia, Brazil

²American University of Technology, Lebanon

The Fe and Ni sublattice magnetizations of ultrathin iron-nickel alloy nanonjunctions [Fe1-cNic] between Fe and Co leads are inspected. For $c \leq 0.4$, the alloy has a bcc structure and becomes fcc otherwise. A combined EFT and MFT treatment is used to obtain the sublattice magnetizations of Fe and Ni in the individual layers as a function of temperature and concentration. This is achieved by calculating single site spin correlations within EFT and making use of reliable experimental data such as lattice parameters a , stiffness spin constants D , and Curie temperatures T_c leading to reasonable values of the exchange parameters J . According to our model, the alloys forming the bcc nanojunctions we examine ($c = 0.0841; 0.204; 0.268$) are ferrimagnetic with the absence of a compensation temperature while those for the fcc structures ($c = 0.5; 0.81$) are ferromagnetic. These EFT results feed the MFT calculations for the nanojunction from the interface inwards. The effect of adding several alloy layers to both bcc and fcc types is also considered. The sublattice magnetizations are necessary elements for certain spin dynamic computations, such as ballistic magnon transport across embedded nanojunctions in magnonics.

Biography

Elie A Moujaes completed his PhD in Theoretical Condensed Matter Physics from the University of Nottingham, UK (2007). He has two Postdoctoral experiences: One at the University of Nottingham and the other at the Federal University of Minas Gerais (UFMG). He has more than 10 publications in well respected journals and is currently an Adjoint Professor at the Federal University of Rondônia. His research involves magnetism and magnetic materials as well as DFT calculations associated with electron phonon coupling for various bi-dimensional exotic materials.

eamoujaes@unir.br

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