Magnetic behavior of Fe_xCo_{1-x} nanochains on the Pt(111) surface

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An intense effort has been dedicated to the development of new nanostructured magnetic materials of transitions metals, due to their interesting properties and potential applications especially for high magnetic recording media. The main properties for the magnetic information storage are the magnetic anisotropy energy (MAE) and the saturation magnetization [1-3]. In this context experimental and theoretical results of Fe_xCo_{1-x} monolayer on the Pt(111) surface display high magnetic moments and anisotropies [1]. Motivated by these results here we study magnetic properties of Fe_xCo_{1-x} nanochains on the Pt(111) surface using the first principles real space-linear muffin-tin orbital–atomic sphere approximation method within the density functional theory [4-5]. Our calculations reveal that Fe and Co spin magnetic moments are large and do not vary with the linear alloy concentration . The average spin magnetic moment is then a linear function of the Fe concentration. We also discuss the orbital magnetic moments as a function of the linear alloy concentration. We infer that the MAE in the Fe_xCo_{1-x} nanochains on the Pt(111) surface can be very large, due to the large magnetic moments.

[1] G. Moulas et al., Phys. Rev. B 78, 214424 (2008).

[2] T. Burket at al., Phys. Rev. Lett. 93, 0272003 (2004).

[3] C. Neise at al., Phys. Status Solidi B, 248, 2398 (2011).

[4] P. R. Peduto et al., Phys. Rev. B 44, 13283 (1991).

[5] S. Frota-Pessôa, Phys. Rev. B 46, 14570 (1992).