Enhancing Dzyaloshinskii-Moriya Interaction in Pt/Co/Pt structure by Gd dusting

C Değer,[1] F Dörr,[2] Y A Shokr,[2,3] P Fumagali,[2] R Macedo,[4] S Cardoso,[4,5] and M Erkovan[4,5]

[1] *Marmara University, Physics Dept. 34722, Ziverbey, Istanbul, Turkey*
[2] *Institut für Experimentalphysik, Freie Universität Berlin, Arnimallee 14, 14195 Berlin, Germany.*
[3] *Faculty of Science, Department of Physics, Helwan University, 17119 Cairo, Egypt*
[4] *Instituto de Engenharia de Sistemas E Computadores – Microsistemase Nanotecnologias (INESC MN) Lisbon, 1000-029, Portugal*
[5] *Instituto Superior Tecnico (IST), Universidade de Lisboa, 1040 001 Lisbon, Portugal.*

Stabilizing chiral spin textures in magnetic thin films is generally dependent on the interfacial Dzyaloshinskii-Moriya interaction (iDMI) along with the exchange interaction. Especially, enhancing iDMI in thin films with perpendicular magnetic anisotropy (PMA) such as Pt/Co/Pt multilayers is still a challenge. In this study, the influence of Gd layer dusting on PMA, iDMI, and exchange energy in Pt/Co/Pt structure is investigated by first-principles calculations. The magnetic properties of structures were investigated by Vibrating Sample Magnetometry and also via domain wall expansion by Kerr Microscope. We show that the existence of Gd dusting layer leads to an enhancement in iDMI, while the strong PMA of the system is preserved. The exchange energy of the system was also reduced by the Gd insertion to the interface. We anticipate that our study not only offers a rational design for controlling the strength of the iDMI, PMA, and exchange energy but also will inspire future considerations about the influence of rare-earth element dusting on magnetic properties.