

4th International Conference on

Condensed Matter and Materials Physics

August 16-17, 2018 | London, UK

Skymions nucleation in CoFeB amorphous nanodisks: A simulation study

Mohamed El Hafidi

Hassan II University of Casablanca, Morocco

The emergence of topological structures, such as magnetic skyrmions and vortices gave a great push in memories construction. In this work, we investigate skyrmions nucleation and annihilation, and their stabilization in an amorphous ferromagnetic $\text{Co}_{0.400}\text{Fe}_{0.400}\text{B}_{0.200}/\text{Pt}(1.3\text{nm})$ nanodisk (Fig.1.). This kind of nanomaterials are characterized by their strong perpendicular magnetic anisotropy PMA and high interface Dzyaloshinskii-Moriya interaction iDMI values ($0 < D < 0.45 \text{ mJ/m}^2$) depending on the platinum layer thickness providing ideal conditions for skyrmions birth. Notice that skyrmions are promising for ultracompact data storage processing and may open up emerging field of potential applications. This study is accomplished within the framework of a phenomenological continuum model established to characterize the chiral states in the system. Simulations are carried out using Mumax3 software. We show that iDMI We show that iDMI favors the appearance of skyrmions in a limited range. We also elucidate the effect of a magnetic field applied perpendicularly to the plane of the nanodisk as well as the diameter of the nanodisk on the skyrmions stabilization.

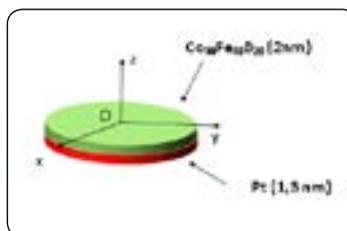


Fig.1: Schematic representation of the investigated nanodisk.

Recent Publications

1. M. Fattouhi, M.Y. El hafidi and M. EL HAFIDI (2018) Single Skyrmion induced by external magnetic field in CoFeB ferromagnetic alloy nanodisks. J.M.M.M accepted, <https://doi.org/10.1016/j.jmmm.2018.07.054>
2. M. Fattouhi • M. Y. El Hafidi • M. El Hafidi • A. Kassiba and • N. Yaacoub. (2018) Study of Nucleation/Annihilation Process and Vortices Characteristics in Co/Py Rectangular Bilayers. Journal of Superconductivity and Novel Magnetism. <https://doi.org/10.1007/s10948-018-4725-5>.

Biography

Mohamed El Hafidi is Professor of Quantum Physics and Magnetism at Hassan University II of Casablanca (Morocco) since 1985. He prepared a part of his PhD at the High Magnetic Field Laboratory (Grenoble, France) and he stayed as a visiting professor at Joseph Fourier University of Grenoble. He currently supervises research on topological structures and low dimensionality magnetic systems.

mohamed.elhafidi@univh2c.ma