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Magnetic skyrmions study in Fe(0.34nm)/Gd(0.45nm, 0.50nm, 0.55nm)]×80 multilayers

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Recently, the attention has shifted to ultrathin ferromagnetic/heavy metal films deposited by sputtering, allowing to explore how the balance of ferromagnetic exchange, anisotropy and dipolar energy results in cylindrical domains. Therefore, we have started to investigate Fe(0.34nm)/Gd(0.45nm, 0.50nm, 0.55nm)]×80 multilayers, which can reveal skyrmion lattices at room temperature. The magnetic phase diagram for these thin films displays that a broad skyrmion phase takes place around room temperature. In this project, we will explore the formation of dipole-stabilized skyrmion lattices in amorphous Gd/Fe based multilayers, with the focus to develop an understanding of the mechanisms that are responsible for the expected stabilization of chiral textures. For this purpose, the magnetic parameters will be controlled by varying the thickness of the materials and material parameters in order to study how the skyrmion phase will be changed. The structure and morphology, the transport properties, and the skyrmion phase of the grown samples will be investigated by means of X-ray diffraction, SQUID-VSM systems, and polarized neutron reflectometry experiment, respectively.

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