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R. Córdoba, D.-S. Han, B. Koopmans

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Manipulating the switching in modulated iron nanowires grown by focused electron beam induced deposition

R. Córdoba¹, D.-S. Han¹ and B. Koopmans¹

¹Department of Applied Physics, Eindhoven University of Technology, PO Box 513, 5600 MB Eindhoven, The Netherlands

Author information

Corresponding Author

*E-mail: rosa.cordoba.castillo@gmail.com

Abstract

The future technological impact of smaller, faster and more efficient spintronic devices compared to current technologies inspires the quest of new approaches and strategies. Emerging non-conventional nanofabrication tools are required for this purpose. One attractive technique is Focused Electron Beam Induced Deposition, a direct-writing process of ferromagnetic nano-objects. Here, we report the fabrication of highly pure iron wires with one-dimensional thickness modulation using diiron nonacarbonyl, $\text{Fe}_2(\text{CO})_9$ as starting material. For that purpose, we employ a strategy for the electron beam scanning method, in which the beam spots are separated a certain distance from each other in one direction during the deposition process. Magnetic properties of the wires have been experimentally studied by magneto-optical-Kerr microscopy and supported by micromagnetic simulations. Our results suggest that the thickness modulation induces a local magnetic anisotropy along the short axis on the iron wire,

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