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

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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, $Fe_2(CO)_9$ 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,