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Influence of the magnetic properties and repetitions on the energy product in layered thin film hard soft magnetic nanocomposites DAVID ZAGARDO, JAMILEH BEIK MOHAMMADI, ANDREW TUGGLE, CLAUDIA MEWES, TIM MEWES, TAKAO SUZUKI, University of Alabama, MINT CENTER TEAM — Exchange spring composites (hard-soft magnetic composites) are interesting for many applications such as rare-earth free permanent magnets [1] and information storage [2]. One key aspect is the figure of merit, the energy product, also called $(BH)_{max}$. The system of study is a magnetic nano composite where each bilayer consists of a soft and hard magnetic material of total height of 22 nm. Using micromagnetic simulations we have investigated the influence of different ratios of the volume of the hard and soft layers on the energy product and the number of bilayer repetitions. Our findings indicate that the maximum energy product depends strongly on the volume ratio as well as on the number of repetitions. In addition we have studied the influence of different anisotropy contributions of the hard and soft magnetic layer on the energy product. Finally we have studied the influence of the interlayer exchange coupling on the energy product, which show that strong interlayer exchange coupling is necessary to reach a high energy product.

[1] T. Hozumi et al., J. Appl. Phys. 115, 17A737 (2014); R. Houkawa et al., J. Appl. Phys. 115, 17A707 (2014).

[2] J. Lee et al., Nanotechnology 25, 045604 (2014); T. Tanaka et al., IEEE Transactions on Magnetics 150, 3000503 (2014).

Claudia Mewes
University of Alabama

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