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Exchange coupled $L1_0$ FeCuPt/Fe heterostructures: Magnetic properties and reversal behavior at elevated temperatures

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Exchange-coupled heterostructures were prepared by combining hard magnetic $L1_0$ FeCuPt alloy films with soft magnetic Fe thin films. For the FeCuPt thin film, the addition of Cu allows adjusting magnetic properties such as perpendicular magnetic anisotropy, coercivity, saturation magnetization, and Curie temperature. The coupling to thin Fe layers, providing high saturation magnetization and high Curie temperature, leads to lowering of the switching field of the hard magnetic FeCuPt layer and to a reduction of thermally induced recording errors. We have investigated the influence of the Fe layer thickness on the switching behavior of the hard layer, revealing a strong reduction for Fe layer thicknesses larger than the exchange length of Fe of about 2 nm. Furthermore, superior performance of bilayer structures in comparison to single FeCuPt layers has been demonstrated by recording experiments at temperatures below 150 °C, employing a scanning magnetoresistive microscope.

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