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Evolution of magnetic domain reversal with temperature in Co/Pt multilayers observed by magneto-optical Kerr imaging X.P. XIE, X.W. ZHAO, J.W. KNEPPER, F.Y. YANG, R. SOORYAKUMAR, The Ohio State University — The nucleation and evolution of magnetic domain structures with temperature and magnetic field in Co(4 Å)/Pt(t_{Pt}) multilayers with perpendicular anisotropy have been studied by magneto-optical imaging techniques. Relatively large Pt layer thicknesses t_{Pt} = 43 Å and 63 Å are chosen for this study because the interlayer coupling strength in the multilayers varies from weak at room temperature to strong at low temperature. Kerr imaging during the magnetization reversal processes shows the transformation of domain patterns with temperature, which correlates directly with enhancement of interlayer exchange coupling with decreasing temperature, as well as the conversion from domain- wall-propagation dominant reversal at room temperature to nucleation-dominant reversal at low temperatures. The enhanced interlayer coupling at low temperatures leads to the entire multilayer switching as a single ferromagnet; while at higher temperatures, when the interlayer coupling weakens, quasi-independent layer-by-layer magnetic reversal is observed. The transformation from propagation- to nucleation-dominant magnetic reversal can be understood by the competition between activation energies for domain nucleation and propagation, Zeeman energy and thermal energy.

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