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Kerr Imaging of Co/Pt multilayers with perpendicular anisotropy

M. ROBINSON, Y. AU, J. KNEPPER, F. YANG, R. SOORYAKUMAR, The Ohio State University — Co/Pt multilayer films are promising materials for applications such as in high density magnetic recording media. For very thin Co layers these structures exhibit perpendicular magnetization. The exchange coupling between adjacent Co layers is ferromagnetic and the coupling strength oscillates as the non-magnetic Pt layer thickness (t_{Pt}) ranges from 3 to 75 Å. In order to understand the magnetization reversal process in these structures, we report on magneto-optical images of a series of $[\text{Co}(4 \text{ Å})/\text{Pt}(t_{Pt})]_N$ multilayers obtained with Kerr microscopy as a function of t_{Pt} and layer repetition N . The images reveal the evolution of the magnetic reversal process that strongly depends on t_{Pt} and therefore on the inter-layer coupling. For Co/Pt multilayers with small t_{Pt} , e.g., 11 Å, when Co layers are strongly coupled, the whole multilayer switches as a single ferromagnet. As Co layers are farther separated and decoupled, e.g., at $t_{Pt} = 41 \text{ Å}$, Co layers switch independently and layer by layer switching was observed by Kerr imaging. The response of these distinct magnetic phases to external magnetic fields and their relationship to details of the hysteresis loops will be discussed.

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