

Structure and GMR of electrodeposited Co/Cu multilayers prepared by two-pulse and three-pulse plating

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In order to better understand the formation of individual layers and their influence on giant magnetoresistance (GMR), Co/Cu multilayers (MLs) produced by two different deposition strategies were compared. The first series of Co(2nm)/Cu(t_{Cu}) MLs with $t_{Cu} = 0.5$ to 6 nm was prepared with galvanostatic/potentiostatic (G/P) two-pulse plating at optimized Cu-deposition potential. In the second series, first a Co(2nm)/Cu(6nm) bilayer was deposited after which another G pulse was applied with a small anodic current to dissolve part of the Cu layer to reach the same t_{Cu} values as in the first series. The G/P/G pulse combination yields MLs for which GMR can be obtained even at such low Cu layer thicknesses where G/P MLs already exhibit bulk-like MR only. The different structural quality of the two series were shown by the absence or presence of ML satellite reflections in the XRD patterns. In the G/P/G MLs with small t_{Cu} values, superparamagnetic regions were also identified resulting from an increased Cu content of the magnetic layer caused by Co segregations. Coercive force and remanence measurements gave further support for the above interpretation of the GMR data.