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Systematic tuning of magnetization reversal properties in Permalloy nanowires using sloped ends OLEG PETRACIC, DAN READ, RUSSELL COWBURN, Imperial College London — The magnetization reversal of Permalloy (NiFe) nanowires was investigated by Magneto Optic Kerr effect (MOKE) magnetometry, where one end of the wire exhibits a slope in the thickness. Arrays of straight nanowires with a thickness of 8nm, widths of 150nm and 100um length were prepared by electron-beam lithography. The sloped ends were achieved by using penumbra shadow masks during NiFe deposition. The topography of the wires was studied by atomic force microscopy. One finds that the slope profile can be tuned by the position under the mask, mask-to-sample distance and angle of deposition. Corresponding MOKE hysteresis loops show a systematic reduction of the coercive field with increasing length of the sloped part. E.g. wires, where the slope has a length of 30um exhibit a coercive field of 11 Oe, whereas nanowires without sloped ends show 107 Oe. One can conclude that the coercivity can be controlled not only by modifying the lateral shape of magnetic nanoelements but also by their thickness profile.

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