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**Nanostructural effects on the magnetic anisotropy in epitaxial thin films** MUKUT MITRA, University of Toledo, SUZANNE TE VELTHUIS, Argonne National Laboratory, ROSA ALEJANDRA LUKASZEW, University of Toledo — We have observed singular behavior in the anisotropy properties during magnetization reversal of epitaxial thin films studied with longitudinal magneto-optical Kerr effect (MOKE). We have observed that annealed Ni films epitaxially grown on (001) MgO substrates exhibit additional uniaxial anisotropy superimposed to the expected four-fold anisotropy due to magnetocrystalline anisotropy. Non annealed films only show four-fold symmetry. We will show that this additional anisotropy can be explained in terms of nanostructural changes of the film surface via oxidation as well as interfacial changes. Further, annealed and non-annealed films exhibit peculiar high coercive values along the magnetization hard axes. This is particularly noticeable as "spikes" in a polar plot representation of the coercive field. We have proposed a model to explain these "spikes" in terms of a second order type of transition for the magnetization before reversal that implies enhanced domain nucleation during switching along these particular directions. In order to validate our model we have performed polarized neutron reflectometry (PNR) studies on these films. We will present our correlated MOKE and PNR studies.

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