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Magnetic Force Microscopy Study of the Spin Reorientation Transition in $Nd_2Fe_{14}B$[1] MUHAMMAD SALEEM, University of British Columbia, JASON HOFFMAN, MAGDALENA HUEFNER, XIAOYU LIU, Harvard University, RUSLAN PROZOROV, PAUL CANFIELD, Iowa State University, JENNIFER HOFFMAN, Harvard University — $Nd_2Fe_{14}B$ is a hard magnet that possesses one of the highest available magnetic energy density, which has led to its use in many commercial applications, as well as studies of magnetic domain structure. At room temperature, $Nd_2Fe_{14}B$ shows a strong uniaxial magnetic anisotropy along its crystalline c-axis. At T_{SR} = 135 K it undergoes a spin reorientation transition, below which it shows an easy-cone magnetization where magnetic moments cant away from the c-axis. In this study we use magnetic force microscopy (MFM) to image the magnetic features as a function of temperature through the spin-reorientation transition in $Nd_2Fe_{14}B$ single crystal. We observe a pronounced change in the anisotropy of the magnetic features upon cooling from 170 K to 100 K. Our analysis reveals an increase in the four-fold component of the anisotropy below T_{SR}, which peaks at a length scale around 6 μm. The magnetic feature size observed here is comparable to previously reported magnetic features of $Nd_2Fe_{14}B$ using magneto-optical Kerr effect.

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