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Antiferromagnetism in a Fe50Pt40Rh10 thin film investigated using neutron diffraction[1] GARY MANKEY, University of Alabama, DIETER LOTT, JOCHEN FENSKE, ANDREAS SCHREYER, GKSS Research Center, PRAKASH MANI, University of Alabama, FRANK KLOSE, Australian Nuclear Science and Technology Organization, WOLFGANG SCHMIDT, KARIN SCHMALZL, Juelich Research Center, ELENA TARTAKOVSKAYA, National Ukrainian Academy of Science — The temperature-dependent magnetic structure of a 200 nm thick single-crystalline film of Fe[50]Pt[40]Rh[10] was studied by unpolarized and polarized neutron diffractions. By applying structure factor calculations, a detailed model of the magnetic unit cell was developed. In contrast to former studies on bulk samples, our experimental results show that the film remains in an antiferromagnetic state throughout the temperature range of 10–450 K. Remarkably, it can be demonstrated that the antiferromagnetic structure undergoes a smooth transition from a dominant out-of-plane order with the magnetic moments orientated in-plane to an in-plane order with the magnetic moments orientated perpendicular to the film plane. Theoretically this can be explained by the existence of two competing anisotropy contributions with different temperature dependencies.

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