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Using X-Ray Diffraction Microscopy for Imaging Magnetic Domain Structures of Magnetic Thin Films OLEG KRUPIN, European XFEL GmbH, Germany & SLAC National Laboratory, USA, J.J. TURNER, SLAC National Laboratory, USA, X. HUANG, London Centre for Nanotechnology, University College London, United Kingdom, K.A. SEU, Lawrence Berkeley National Lab, USA, D. PARKS, S. KEVAN, University of Oregon, USA, E. LIMA, K. KISSLINGER, Brookhaven National Lab, USA, I. MCNULTY, Argonne National Lab, USA, R. GAMBINO, Material Science and Engineering, Stony Brook University, USA, S. MANGIN, Institut Jean Lamour, CNRS/Nancy-Universite, Nancy, France, S. ROY, P. FISCHER, Lawrence Berkeley National Lab, USA — We report the application of iterative phase retrieval from magnetic x-ray diffraction for imaging magnetic domain structures of magnetic thin films. Using coherent x-ray scattering at the x-ray photon energy corresponding to the $L_{3,2}$ absorption edges of the 3d material Co, we demonstrate that linearly polarized soft x rays can be used to obtain the element specific information about both the amplitude and the phase of magnetic domain structures existing in thin films. We successfully recovered an image of the magnetic structure of an amorphous terbium-cobalt thin film with a spatial resolution of about 75 nm and could differentiate between the magnetization directions, finding qualitative agreement with soft x-ray microscopy images recorded with Fresnel zone plate optics having better than 25 nm spatial resolution.

Oleg Krupin
European XFEL GmbH, Germany & SLAC National Laboratory, USA

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