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High-Frequency Surface Acoustic Wave Propagation in Nanostructures Characterized by Coherent Extreme Ultraviolet Beams MARK SIEMENS, QING LI, Department of Physics and JILA, University of Colorado, Boulder CO, KEITH NELSON, Department of Chemistry, Massachusetts Institute of Technology, Cabridge MA, RONGGUI YANG, Department of Mechanical Engineering, University of Colorado, Boulder CO, ERIK ANDERSON, Center for X-ray Optics and Lawrence Berkeley Laboratories, Berkeley CA, MARGARET MURNANE, HENRY KAPTEYN, Department of Physics and JILA, University of Colorado, Boulder CO — We study ultrahigh frequency surface acoustic wave propagation in nickel-on-sapphire nanostructures. We make use of high-order harmonic generation to obtain ultrafast, coherent, beams in the extreme ultraviolet (EUV) region of the spectrum. The short wavelengths ∼30 nm allow us to measure propagation dynamics of surface acoustic waves to frequencies of nearly 50 GHz, corresponding to wavelengths as short as 125 nm. We repeat the measurement on a sequence of nanostructured samples to quantify dispersion of surface acoustic waves in a nanostructure series for the first time [1]. These measurements are critical for accurate characterization of interfaces beneath very thin films using this technique. [1] M. E. Siemens, et al. Applied Physics Letters, 94(9):093103, 2009.

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