

Abstract Submitted  
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**Grazing-incidence coherent x-ray imaging in true reflection geometry**<sup>1</sup> TAO SUN, ZHANG JIANG, JOSEPH STRZALKA , JIN WANG, Argonne National Laboratory, APS SECTOR 8 TEAM — The development of the 3<sup>rd</sup> and 4<sup>th</sup> generation synchrotrons has stimulated extensive research activities in x-ray imaging techniques. Among all, coherent diffractive imaging (CDI) shows great promise, as its resolution is only limited by the wavelength of the source. Most of the CDI work reported thus far used transmission geometry, which however is not suitable for samples on opaque substrates or in which only the surfaces are the regions of interest. Even though two groups have performed CDI experiments (using laser or x-ray) in reflection geometry and succeeded in reconstructing the planar image of the surface, the theoretical underpinnings and analysis approaches of their techniques are essentially identical to transmission CDI. Most importantly, they couldn't obtain the structural information along sample thickness direction. Here, we introduce a reflection CDI technique that works at grazing-incidence geometry. By visualizing Au nanostructures fabricated on Si substrate, we demonstrate that this innovative imaging technique is capable of obtaining both 2D and 3D information of surfaces or buried structures in the samples. In the meanwhile, we will also explain the grazing-incidence-scattering based-algorithm developed for 3D phase retrieval.

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Tao Sun  
Argonne National Laboratory

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