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Missing Material At The Buried Interface For Ag/Si(111)7x7 Thin Films Deposited at Glancing Angle[1] S.T. HAYDEN, YIYAO CHEN, University of Missouri - Columbia, M.W. GRAMLICH, University of Massachusetts - Amherst, R.S. GARI, G.M. KING, P.F. MICELI, University of Missouri - Columbia — Missing material (vacancies) below the exposed surface has not been widely investigated during film growth because conventional surface science experiments do not probe below the surface (STM, LEED, etc.). X-ray scattering techniques, however, can uniquely explore the role of buried defects in epitaxial crystal growth, owing to its sensitivity to both the surface and the subsurface. Our prior work has shown the presence of vacancies in homoepitaxial film growth (Kim et al., Appl. Phys. Lett. 91, 093131 (2007) and Phys. Rev. B 86, 155446 (2012)). In the present study of heteroepitaxial Ag/Si grown at glancing angles, X-ray reflectivity and atomic force microscopy (AFM) measurements each yield the same surface height distribution. However, there is a significant portion of sub-surface missing material that is concealed to the AFM, but, which is revealed by the X-ray reflectivity measurements that detect the electron density profile. This missing material is determined to be concentrated at the buried film-substrate interface for deposition-angle-dependent grown Ag/Si(111)7x7.

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