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Stability of the wetting layer in the Pb/Si(111)7x7 quantum-size-effect system M.W. GRAMLICH, S.T. HAYDEN, P.F. MICELI, U. of Missouri, C. KIM, Kyung Hee U., Korea, M.C. TRINGIDES, Ames Labs, E.H. CONRAD, Georgia Inst. Tech. — Studies of Pb/Si(111) have revealed novel physical phenomena, such as Pb nano-islands with quantized height selection (quantum size effects, or QSE) as well as non-classical coarsening behavior with anomalously fast relaxation rates [C.A. Jeffrey et al., PRL **96,** 106105 (2006)]. It is, therefore, of interest to study the dense Pb wetting layer which exists in between the islands and which apparently enables the fast transport of Pb adatoms required for coarsening. This talk will report recent in situ x-ray scattering studies of the stability and structural transitions of the wetting layer without the presence of the nano-islands. Depending on the temperature, it is observed that the Pb8x8 wetting layer on Si(111)7x7 either becomes more ordered or it decays to the alpha phase. For coverage above a monolayer, large 3D crystallites are found to coexist with the alpha phase. The crystallite diffraction peaks appear in the same reciprocal lattice position as for the previously reported domain-wall satellite peaks, which were not observed in our study. Experiments were performed at the MUCAT beamline at the Advanced Photon Source (supported by US-DOE). Research funding is supported by NSF DMR-0706278.

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