Abstract Submitted
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Crystal structure and height selection for Indium growth on Si(111) interfaces[1] J. CHEN, M. HUPALO, M. JI, C.Z. WANG, K.M. HO, M.C. TRINGIDES, Iowa State University and Ames Laboratory of US-DOE — The growth of In/Si(111) has been studied with SPA-LEED and STM to identify whether QSE-driven height selection with mono-disperse distribution is possible. The motivation is to discover other metals besides Pb/Si(111) with high degree of self-organization. Indium growth only on one substrate (Si(111)-Pb-$\alpha - \sqrt{3}x\sqrt{3}$) has resulted in uniform height In(111) 4-layer flat top islands (with the fcc(111) orientation different from the bct In bulk structure). This allotropic transition is observed at low temperatures T<250K and coverages θ <6ML. Otherwise bct(110) oriented Indium islands are observed with continuously increasing height/size aspect ratios. These results suggest two stabilizing energetic effect for the fcc In(111) height selection i.e. Quantum Size Effects (QSE) stabilize uniform height and orientation dependent surface energy favours the different crystallography. The contribution of each effect was studied with first principles calculations and both the height selection and the allotropic transition can be quantitatively explained. -/a

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