

Abstract Submitted  
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**Tuning Surface Energy Landscapes in Metallic Quantum Films using Alkali Adsorbates**<sup>1</sup> ALEXANDER KHAJETOORIANS, SHENGYONG QIN, Dept Physics; U. Texas Austin, WENGUANG ZHU, U. Tennessee-Knoxville; Oak Ridge National Laboratory, HOLGER EISELE, TU-Berlin, ZHENYU ZHANG, U. Tennessee-Knoxville; Oak Ridge National Laboratory, CHIH-KANG SHIH, Dept Physics; U. Texas Austin — Quantum confinement shows a strong interplay with growth and kinetics in thin metal systems where the Fermi wavelength has a special relationship to the surface normal lattice constant. In the case of Pb/Si(111) systems, this relationship reveals an interesting thickness-dependent bilayer oscillation in the density of states and surface energy up to a phase. In this paper, we report on a novel effect: tuning of the energy landscape of a flat-top quantum Pb mesa using Cs adsorbates. Using STM/STS, we show that depositing Cs adsorbates on a thin Pb mesa promotes quantum stable Pb nanoislands on preferentially unstable thicknesses. Thickness-dependent nanoisland densities show a strong bilayer oscillation correlating with quantum stability. By modifying the Cs coverage on the mesa surface, we can tune the lateral size distribution of the nanoislands and the overall amplitude of the island density oscillation. Nanoisland formation is linked to a step decoration of Cs adatoms along the step edge of the nanoisland.

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