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**Surface-catalyzed O2 adsorption on quantum thin films** JISUN KIM, ALEXANDER KHAJETOORIANS, The University of Texas at Austin, WENGUANG ZHU, ZHENYU ZHANG, Oak Ridge National Laboratory & University of Tennessee, CHIH-KANG SHIH, The University of Texas at Austin — Pure crystalline Pb is well known to be inert with respect to oxygen gas. By using scanning tunneling microscopy we demonstrate that the oxygen adsorption on Pb films is greatly increased by Cs adsorbates acting as catalysts. Our previous studies show that Cs atoms can be easily incorporated into the surface layer of thin Pb films grown on Si(111). In addition, Cs adsorbates are able to adjust the surface energy so as to initiate stable Pb nanoislands on Pb flat top mesas of unstable thickness. Because of this unique property of Cs adsorbates on originally inert Pb films, they are a natural choice of template to investigate surface catalysis of quantum thin films. Bare Pb films do not oxidize until much higher coverage (1000L), but in the presence of Cs we see adsorption of oxygen at much lower exposures of only a few Langmuir. The oxidation first occurs preferentially at sites of Cs adsorption. After oxygen clusters nucleate, oxidation of the Pb film increases in proportion to the amount of oxygen exposure. During this process the formation of oxygen clusters forces changes in the film morphology. First-principles density functional theory calculations of the O binding energies on the alloyed surface layers will be done and compared with experiment.

Jisun Kim
The University of Texas at Austin

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