

Abstract Submitted  
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**Probing the mechanism of infrared resonant desorption of hydrogen from Si(111): anharmonicity and energy pooling<sup>1</sup>** ZHIHENG LIU, LEONARD FELDMAN, NORMAN TOLK, Vanderbilt University, ZHENYU ZHANG, Oak Ridge National Laboratory, PHILIP COHEN, University of Minnesota — Desorption of hydrogen from a Si(111) surface by resonant infrared excitation of the Si–H vibrational stretch mode requires vibrational ladder climbing of a Si–H bond to a high level leading to associative desorption. We report recent experiments probing the mechanism of ladder climbing. H<sub>2</sub> desorption is observed when the excitation linewidths are narrower than the anharmonicity of the Si–H bond, favoring energy pooling over multiphoton absorption. The resonance width of H<sub>2</sub> desorption with an excitation linewidth of 8.7 cm<sup>-1</sup> is measured to be 39 cm<sup>-1</sup>, opening a new opportunity for site-selective modification on the Si(111) surface. The desorption yield decreases when the sample temperature increases, consistent with an energy pooling process.

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