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Desorption of Hydrogen from Si(111) by Resonant Excitation of the Si-H Vibrational Stretch Mode[1] ZHIHENG LIU, University of Minnesota, LEONARD FELDMAN, Vanderbilt University, NORMAN TOLK, Vanderbilt University, ZHENYU ZHANG, Oak Ridge National Laboratory, PHILIP COHEN, University of Minnesota — We report first measurements of non-thermal, non-electronic resonant photodesorption of hydrogen from a Si(111) surface using tunable infrared radiation. The wavelength dependence of the desorption yield Shows a peak at 0.26 eV, the energy of the Si-H vibrational stretch mode. The corresponding excitation cross section is determined to be 2.3×10^{-18} cm^2. The desorption yield is quadratic in the infrared intensity and quartic in the electric field along the Si-H bond direction. We postulate that two neighboring hydrogen adatoms, once simultaneously excited in their vibrational stretch mode, can desorb associatively at room temperature.

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Zhiheng Liu
University of Minnesota

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