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Adsorption and desorption of hydrogen on Cu(111) and Xe-covered Cu(111).[1] YIYAN FEI, XIANGDONG ZHU, University of California at Davis — Using an optical ellipsometry technique to monitor adsorbate coverage in-situ, we studied activated adsorption of filament-heated molecular hydrogen on Cu(111) and the isothermal desorption of hydrogen adatoms from Cu(111). The adsorption follows a zeroth order kinetics such that the net sticking probability, though small, is independent of the hydrogen adatom coverage until a saturation coverage is reached. The desorption follows a second-order kinetics with an activation energy of 0.63 eV and a pre-exponential factor of 1×10^9/s. A pre-adsorbed monolayer of Xe atoms on Cu(111) prohibits subsequent adsorption of filament-heated molecular hydrogen, making physisorbed Xe useful templates for spatial patterning of hydrogen adatom density on Cu(111).

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