Hydrogenation of N over Fe{111}

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Abstract

Over the past five decades, ultra high vacuum (uhv) techniques applied to well-defined single-crystal samples (the “surface science paradigm”) have transformed our understanding of fundamental surface chemistry. To translate this success to the world of realistic heterogeneous catalysis, however, requires one seriously to address the fact that real heterogeneous catalysts usually operate under near-ambient or higher pressures. Nevertheless, the surface science paradigm can undoubtedly provide crucial insights into catalytic processes, so long as care is exercised in the design of experiments. Forging a secure link between two radically different pressure regimes is the major challenge, which we illustrate here with reference to the vitally important ammonia synthesis reaction, achieved industrially only under extremely high pressure.