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**In Situ Characterization of Ethylene Hydrogenation on Pt Powder Using Mass Spectrometry-Sum Frequency Generation Technique**

BRYAN HSU, Department of Chemistry, Massachusetts Institute of Technology, SHAWN DOUGAL, PAUL STEVENS, MOHSEN YEGANEH, Exxonmobil Research and Engineering Company, Corporate Strategic Research — Bridging the pressure gap has been of paramount importance to the field of surface science. Unfortunately, the available techniques used to characterize catalytic surfaces have all been limited in some degree by a combination of factors (e.g. low pressure regimes, ex situ analysis, and low surface area catalysts), which do not fully replicate industrially relevant conditions. Here, we present in situ observation of ethylene hydrogenation of Pt powder in a high pressure regime. Using total internal reflection sum frequency generation (TIR-SFG) we are able to identify ethyl, ethylidyne, di-sigma-bonded ethylene, and pi-bonded ethylene surface intermediates and find that these are all present under reactive conditions as monitored with mass spectrometry (MS).

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