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Changes in morphology of Gamma-Alumina-Supported Pt Clusters Under Reaction Conditions: Evidence from In Situ EXAFS Spectroscopy

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Pt clusters on γ -Al₂O₃, MgO, and SiO₂, with average diameters of 11, 20, and 45 Å, were characterized by EXAFS spectroscopy in the presence of H₂, ethene, propene, O₂, and ethane as well as ethene + H₂ and propene + H₂ (undergoing catalytic reaction). Adsorption of alkenes (but not alkanes) or oxygen led to flattening of the smallest clusters (on γ -Al₂O₃) but to essentially no changes in the larger clusters (on MgO or SiO₂); the changes were reversible. The morphology of the smallest Pt clusters depends on the gas composition in alkene hydrogenation catalysis.