

Selective Semihydrogenation of Alkynes with Copper Nanoparticles Supported on Passivated Silica

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Semihydrogenation of alkynes to Z-alkenes is an important industrial process catalyzed by noble-metal-based systems, in particularly Pd.¹ The scarcity and high price of such catalysts spur the development of alternative earth-abundant semihydrogenation catalysts. For instance, supported Cu nanoparticles were found to catalyze the semihydrogenation of propyne under flow conditions.² Surface organometallic chemistry offers a general approach to small narrowly-dispersed supported metallic nanoparticles using molecular organometallic precursors.³ With this methodology, our group has prepared silica-supported Cu particles and utilized high-throughput screening to identify PCy₃ as a ligand for the highly chemo- and stereoselective semihydrogenation of alkynes into Z-olefins.⁴ Here, we explore the modification of the support through passivation⁵ of the OH group to modify the adsorption properties of the supports and to enable the use of broader ligand libraries.

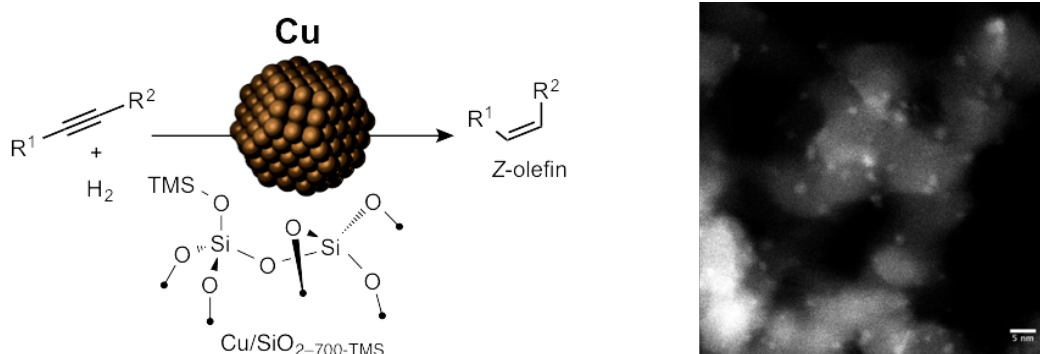


Fig.1. General scheme of selective alkyne semihydrogenation (left) and high-angle annular dark field transmission electron microscopy image of Cu nanoparticles on passivated silica (right).

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