# N-containing silane coupling agent modified Pd/(α-Al2O3) catalyst for semi-hydrogenation of acetylene

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**Abstract**

A highly dispersed monometallic palladium catalyst for selective hydrogenation of acetylene was prepared using N-containing silane coupling agent (SCA) as a modifier. The catalyst exhibited 90.3% ethylene selectivity with full acetylene conversion under 240 °C with a GHSV(C2H2) of 1200 h-1 and performs good stability within a 200 h tolerance test. Characterization results reveal that the excellent ethylene selectivity is mainly derived from the special Pd nanoparticle structure with Pd (111) lattice relaxation and distortion. The N-containing SCA modified catalyst shows more C atoms penetrating into the Pd lattice to form a stable PdC phase. This unique structure possesses an obvious suppression of hydrogen migration from the bulk Pd hydride to the surface and makes the catalyst have more abundant spillover hydrogen on the carrier surface. In addition, it has also weakened the ethylene adsorption ability and led a strong interaction between the Pd nanoparticles and surface.

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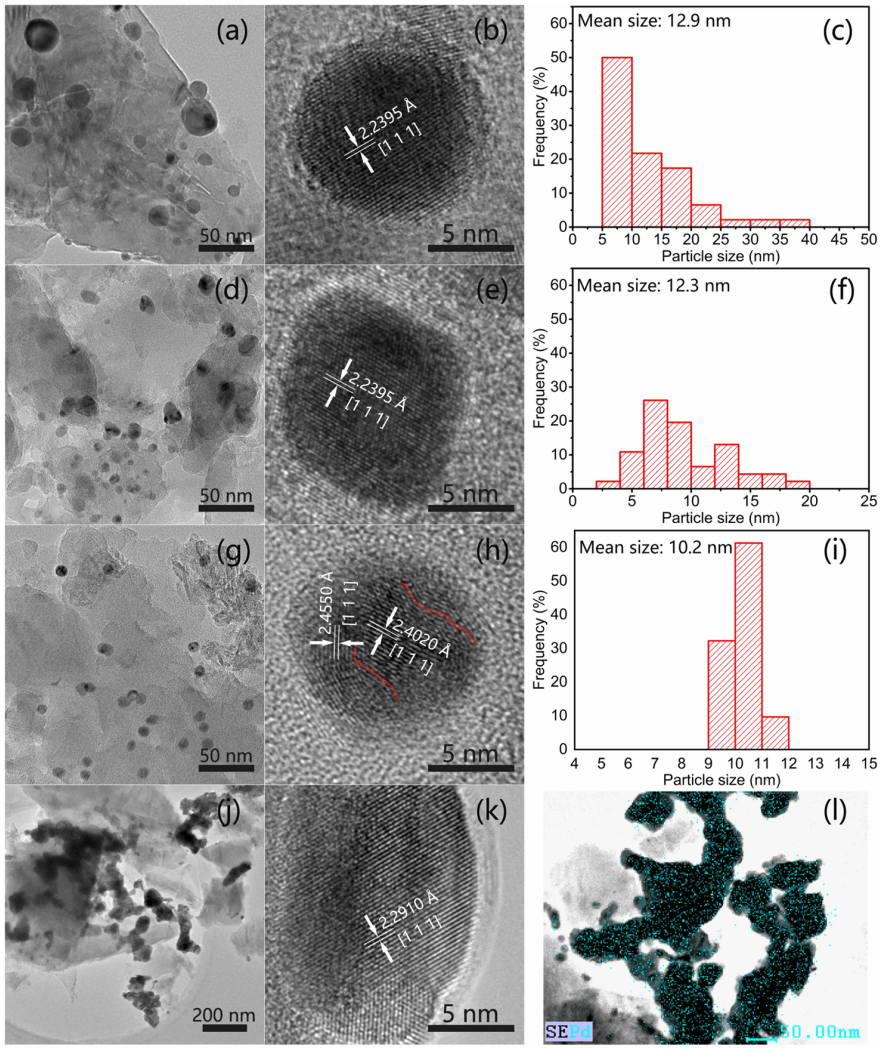


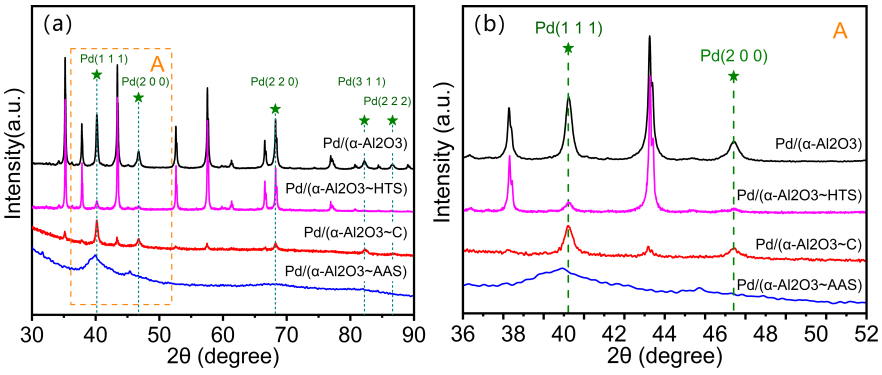

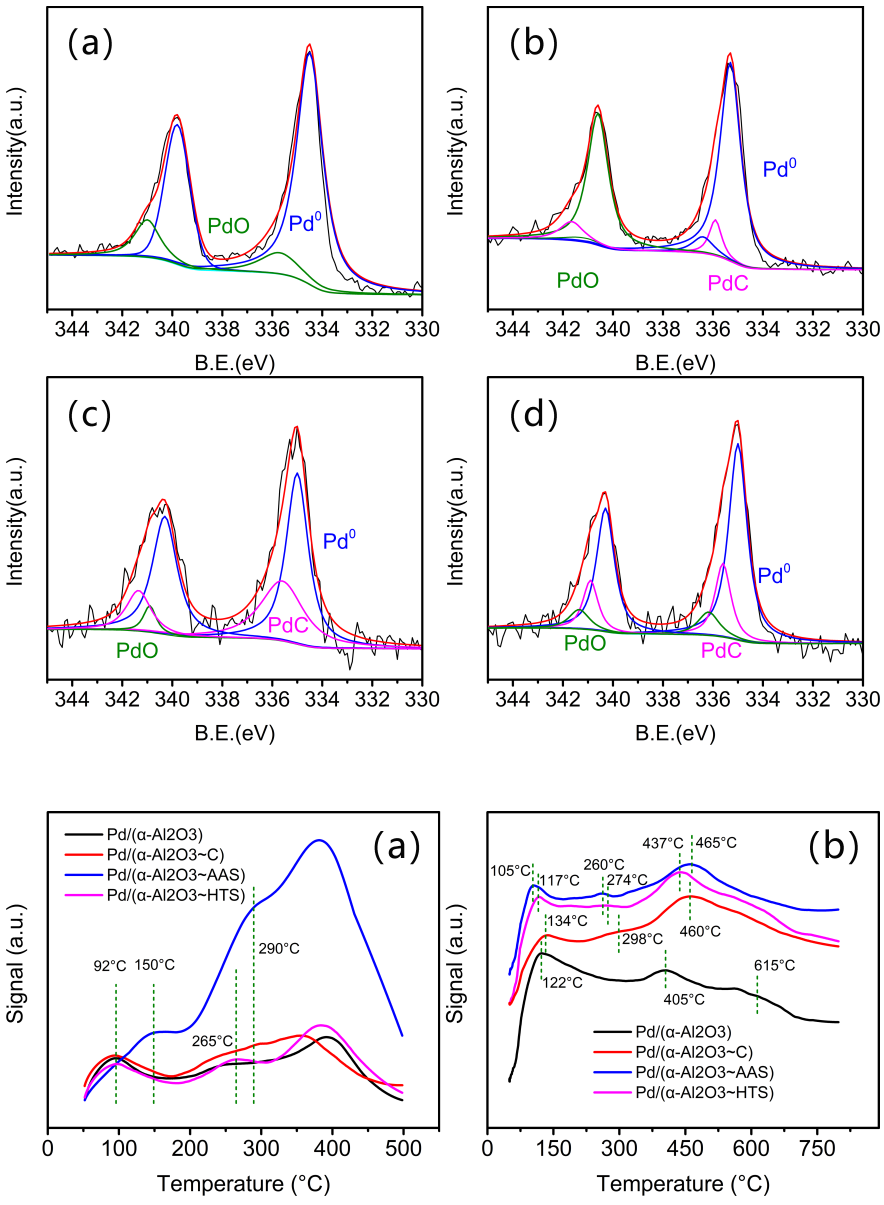

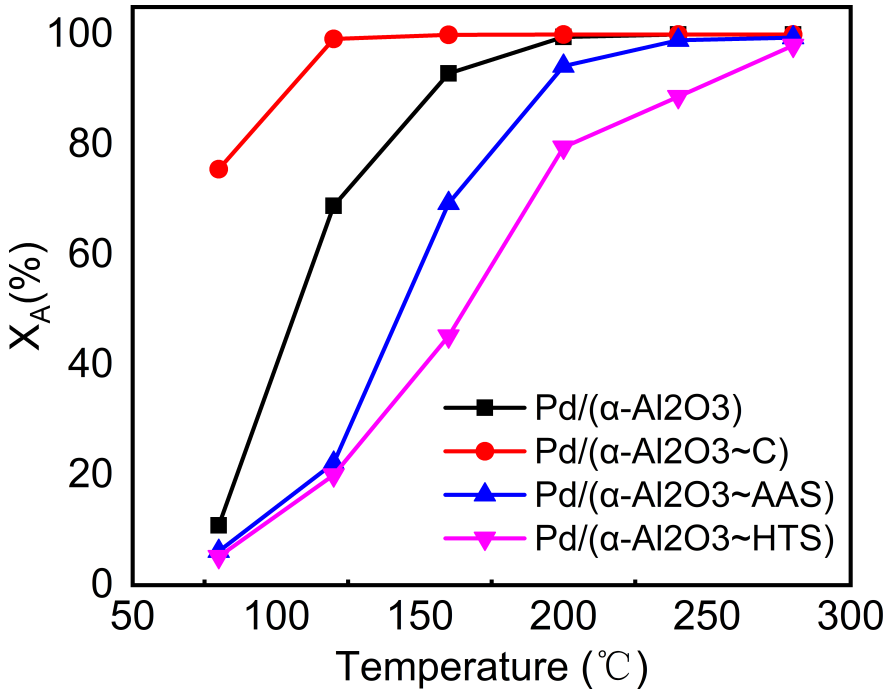


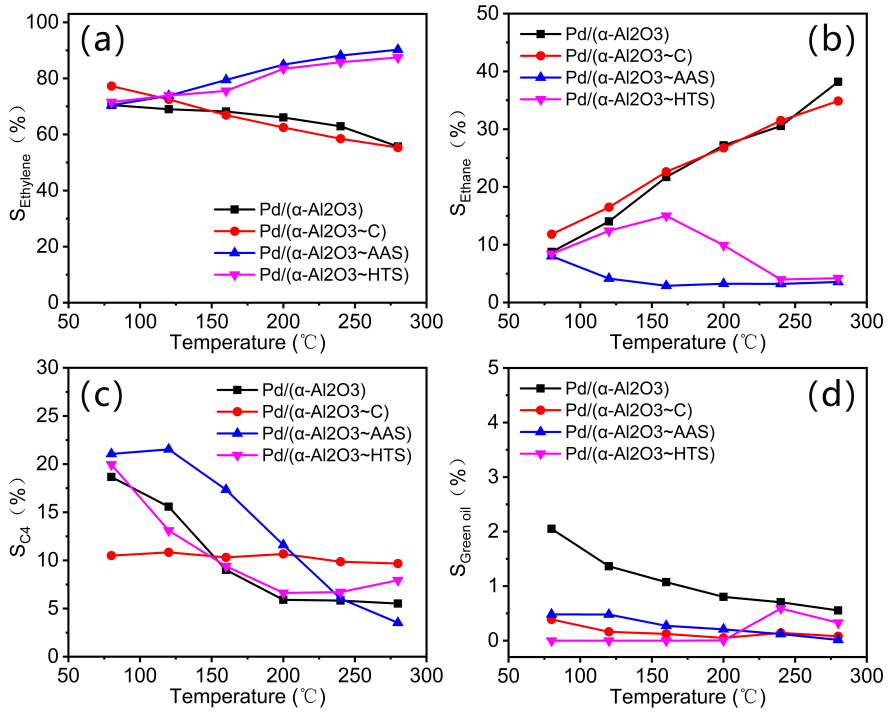

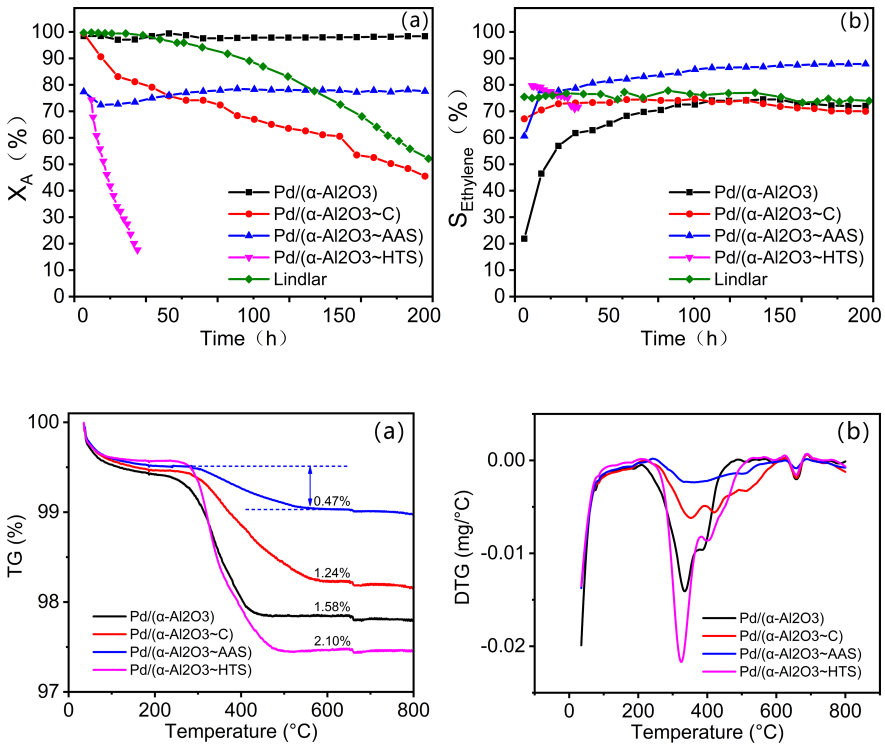


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