Zeolite supported metal catalysts are widely used while the electron beam sensitive zeolite makes the characterization of the catalyst using electron microscope (EM) difficult. In this contribution, a sacrificial-zeolite specimen preparation (SZSP) technique is developed for the EM analysis of the catalyst. The metal particles are transferred from the zeolite support to the deposited nanocarbon generated in the metal catalyzed hydrocarbon reaction. SAPO-34 zeolite with Al2O3 binder supported Pt catalyst is employed as the model catalyst. Pt catalyzed propane dehydrogenation reaction is carried out to deposit the nanocarbon overlayer which the Pt particles are transferred to as the new support for EM observation. The original catalyst, the deposited nanocarbon and the Pt particles on the new support are characterized by scanning electron microscope (SEM), transmission electron microscope (TEM-EDXS), thermogravimetry/differential thermal analysis (TG-DTA), Raman spectrometry, scanning transmission electron microscope (STEM-EDXS). The coke deposited on SAPO-34 and Al2O3 are of different morphologies and structures. The as-observed distribution of Pt particles on the new support suggests enrichment of Pt on SAPO-34. The shape and size of the Pt particles as well as the strong Pt-SAPO-34 interaction are directly observed. The shape and size of the Pt particles as well as the mechanism of SMSI between Pt and the original support are directly observed. This offers a novel route to monitor the metal size and the interaction between the metal and support, which shed a light on the mystery science of heterogeneous catalyst and provide new insights on the relationship among the structure, active site, and reactivity.

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