Investigation of Alumina-based Pt-Ga Systems for Non-Oxidative Propane Dehydrogenation Reaction

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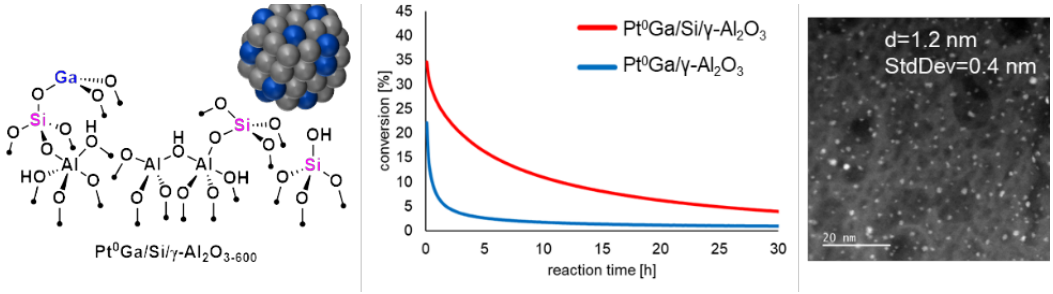
Large scale exploitation of shale gas stimulates the developments of on-purpose propane dehydrogenation (PDH) technologies.[1-3] Both principal processes, based on Cr_2O_3/Al_2O_3 (Lummus Catofin process) and Pt-Sn/Al_2O_3 (UOP Oleflex process), are applied in industry, whereas constant and rapid regeneration are necessary to maintain high productivity. In the case of Pt-based industrial systems, metal promoters and/or additional dopants play important roles to enhance the catalytic properties and stability. In order to understand actual effects of promoters/additives, preparation of tailored systems through SOMC/TMP approach is a powerful methodology since it enables to evaluate surface active structure by using physicochemical and spectroscopic techniques. Silica-based PDH catalysts *via* SOMC/TMP approach have been reported,[4-6] whereas application of SOMC/TMP to alumina-based materials, which are more commonly used in industry, has not been addressed. Herein, we prepared Pt-Ga systems supported on alumina and Si doped alumina *via* SOMC technique, and Si doped Pt-Ga systems showed higher catalytic activity stability to PDH reaction. Considering from STEM-EDX and XAS results, Pt-Ga systems on Si doped alumina included well-dispersed and uniformly alloyed nanoparticles, leading enhanced catalytic properties.



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