Superior stability on pure γ-Al_2O_3 and coke behaviors related with Lewis acid sites during propane dehydrogenation reaction

장은정, 이재경, 곽자훈†
UNIST
(jhkwak@unist.ac.kr†)

In the recent years, the demand of light olefins including the propylene tends to increase, and there is an increasing interest in propane dehydration reaction for producing propylene using catalysts such as Pt-Sn/Al_2O_3. However, in order to obtain high yields of propylene, the high reaction temperature is required which causes severe catalysts deactivation by sintering of metal and coke deposition. Even though considerable research efforts were devoted to improve the stability of Pt-based catalysts supported on alumina, fundamental understanding about the metal-support interaction and the role of acid-base properties of Al_2O_3 is still required because of the mixed effects of alkali and alkali earth metal. Here we report the results of PDH reaction on Pt-Sn catalysts using alumina with different surface properties, including commercial alumina. We were able to classify alumina according to the surface properties with various analysis like ethanol TPD and DRIFTS study. Furthermore, we could observe the effect of such surface properties on reactivity and the changes of coke behavior with various reaction time by excluding the effect of metal sintering.