

Novel Catalytic Function of Intra-zeolite Frustrated Lewis Pairs

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Frustrated Lewis pair (FLP), a set of Lewis acid and base which cannot combine into a Lewis adduct by steric hindrance, can simultaneously donate a proton and a hydride ion to the reactants. This novel concept of catalyst was firstly introduced and coined by Prof. Douglas W. Stephan. Most of FLP compounds are zwitterionic organic molecules such as (C₆F₅)₂BH-HPR₂(R=Mes or tBu).

Recently we have reported the formation and its catalytic activity of intra-zeolite FLP in Pt-nanoparticle loaded NaY zeolite upon hydrogen treatment (350 K, 10 bar) and Prof. G. Ozin also reported the formation and catalytic function of FLP surfaces in In₂O_{3-x}(OH)_y. These newly brought inorganic FLP compounds may perform the same or more efficient catalytic functions than organic FLP compounds, catalytic ionic hydrogenation and hydroconversion of hydrocarbons. Most advantageous properties of inorganic FLP compounds are as follows: 1) heterogeneous catalyst, 2) size and shape selective catalyst 3) recyclable catalyst.

Experimental demonstration of catalytic ionic hydrogenation and hydro-conversion of hydrocarbons will be presented. The applications and future prospective will be discussed.