Morphology dependent ethanol dehydration on γ-Al_2O_3

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We synthesized aluminas with different facet ratio (platelet and rod-shape) and evaluated facet-dependent activity over ethanol dehydration. Platelet- and rod-shaped alumina were characterized by XRD, BET, TEM and ethanol temperature programmed desorption (TPD). Platelet and rod γ-Al_2O_3 showed identical surface characteristics with commercial and similar activities over ethanol dehydration. After 1100°C calcination, commercial γ-Al_2O_3 transformed into α-Al_2O_3. However, platelet transformed into Θ-phase while the rod into the δ-phase after same treatments. Interestingly, Ethanol TPD showed significantly different desorption profiles which suggest different surface characteristic despite similar BET surface area. Their maximum desorption rate showed rod > platelet > commercial order and their ethanol dehydration activity also showed the same trend. All results suggest morphology-dependent phase transformation which led to different activity over ethanol dehydration.