

Highly Porous Aerogels in Acidic and Enzymatic Heterogeneous Catalysis for Biodiesel Production

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Abstract

We propose to study the use of highly porous aerogels as immobilization supports and encapsulation media for heteropolyacids and lipases for a potential application as heterogeneous catalysts in biodiesel production. The catalytic activities of these acidic and enzymatic catalysts were previously investigated in homogeneous catalysis as well as in heterogeneous catalysis, however aerogel materials known for their high porosity were never investigated in this field, except for silica aerogels which were used recently for lipase encapsulation. We plan to immobilize various heteropolyacids and enzymes onto the solid inorganic network of amorphous metal oxide aerogels, namely silica, titania, alumina, iron oxide, and cobalt ferrite, prior to the investigation in heterogeneous catalysis. The structural and textural characterization of these materials will be performed before and after the immobilization of the catalyst. Investigating the catalytic activity of the final product in biodiesel production from waste cooking oils and non-edible oils will elucidate their behavior in various media and allow us to compare the efficiency of the catalyst in various conditions.