ABSTRACT:

Unlocking Surface Acidity in Metal–Phosphate Silica Networks

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Me-P2O5-SiO2 ternary mixed oxides (Me = Nb, Ti, Zr) materials have been prepared through innovative sol-gel routes and extensively characterized, with a special focus devoted to the analysis of surface acidity. The complex network of Metal-Phosphorus species dispersed in siloxane matrix leads to different exposed surface sites: weakly acidic silanols; Bronsted acidic sites related to the presence of Phosphorus and Niobium; medium-weak Lewis acidic sites, associated with the presence of exposed coordinatively unsaturated Nb, Zr and Ti ions [1,2]. The effect of hydrothermal treatment on microporous structure and surface acidity was also investigated, suggesting that the formation of interconnected Si–O–Me–O–P surface domains could be a suitable stabilization strategy for phosphate-based solid materials [3]. Thus, the modulated surface acidity, largely preserved also in demanding conditions, makes these materials useful candidates in heterogeneous catalytic processes such as conversion of chemicals from biomasses (i.e. dehydration of alcohols and hydrolysis of disaccharides).

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