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CARBON MATERIALS AS TEMPLATE FOR THE PREPARATION OF MIXED OXIDES WITH CONTROLLED MORPHOLOGY

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Bulk mixed oxide catalysts are widely used for many applications, such as catalysts for selective oxidation processes, electrocatalysts for fuel cells, gas sensors, and solid oxide electrolysers for the production of hydrogen. VPO (vanadium and phosphorous oxides) are one of the bulk mixed oxide materials which are of interest nowadays since they are active catalysts for saturated hydrocarbon activation. With the conventional synthesis procedures for preparing bulk mixed oxides is really difficult to control the morphology and the porous structure of these materials. In practice, there are just a few works about the synthesis of mixed oxide materials with controlled morphology. The aim of this work was to describe new approaches for the preparation of VPO mixed oxides materials with spherical morphology.

A carbon material was prepared using cellulose as starting material by hydrothermal treatment with phosphoric acid at 200ºC and carbonized at 500ºC. SEM analysis showed that carbon spheres with diameter up to 0.5 □m were prepared by this procedure. These phosphorous containing carbon material was impregnated with the appropriate amount of vanadium oxide species in order to obtain a monolayer of VOx species on the surface of the carbon materials following a procedure described previously (1). By this manner, a carbon supported VOx material with spherical morphology was obtained (VPO/Csph). The calcination of this material was optimized in order to obtain VPO spheres with diameter up to 1-2 □m and with BET area values close to 100 m2/g. Figure 1 shows a SEM image of this sample (VPOsph). The presence of vanadium pyrophosphate phase, which has been described as the active phase of this catalytic system, was identified by XRD and Raman spectroscopy. Thus, the chemical composition as well as the morphology and porous structure of these new spherical materials makes them quite promising as catalysts.

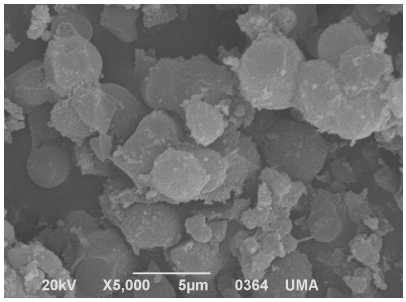

Figure 1. SEM image of VPOsph catalyst.

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References

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