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Crystallographic studies through HRTEM and XRD of MoS2 nanostructures

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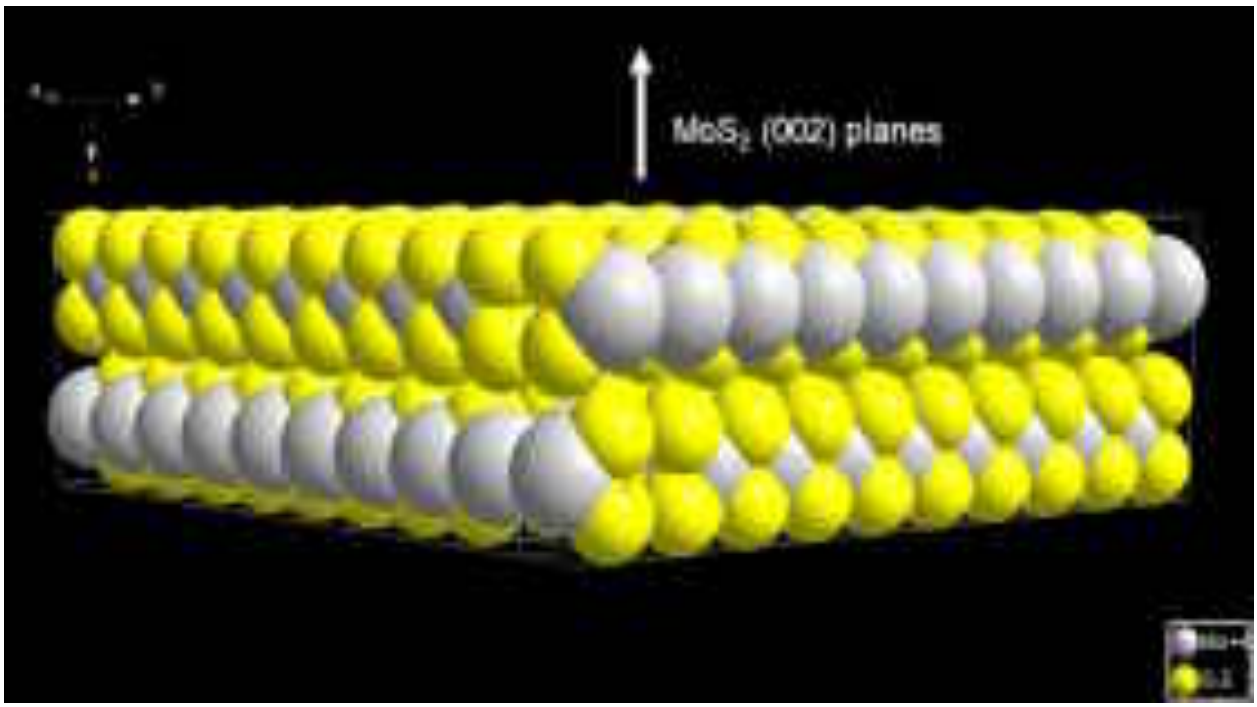
Mesoporous and silica-based SBA-15 and SBA-16 materials were used as supports of novel nanostructured ternary Co(Ni)-Mo-W hydrodesulphurization (HDS) catalysts. These materials have shown a high catalytic activity in HDS of dibenzothiophene (DBT) reactions, even much higher compared with commercial catalysts. An exploration was made on the structure of both the supports as well as on tri-metallic sulfide HDS catalysts. The sulfided catalysts were tested in the HDS of DBT performed in a batch reactor at 623 K and total pressure of 3.1 MPa. The calcined and fresh sulfide catalysts were characterized by a variety of techniques, such as N2 adsorption-desorption isotherms, Temperature-Programmed Desorption (TPD) of NH3, X-ray Diffraction (XRD) and High Resolution Transmission Electron Microscopy (HRTEM). It has been found that both the morphology of the supports as its modification with varying amounts of phosphorus affect the catalytic activity of these nanostructured materials in HDS of DBT reactions. Furthermore, the nanostructures which correspond to the tri-metallic sulfided catalysts exhibit a typical morphology of MoS2 – 2H structure. The present work shows the microstructural study of these nanostructured materials, carried out from HRTEM images and XRD analysis. Both techniques, X–ray Diffractometry and High Resolution Transmission Electron Microscopy, play a fundamental role in the characterization of the microstructure of HDS catalytic nanomaterials, as well as in understanding the various phenomena involved, starting from the synthesis process unto the final performance of those materials.



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