New insides in the characterization of HDS industrial catalysts by HAADF-STEM

PAZ DEL ANGEL, ARTURO PONCE, JOSEFINA AREL-LANO, MIGUEL J. YACAMAN, Universidad of Texas, San Antonio, MARTHA HERNANDEZ-PICHARDO, Instituto Politecnico Nacional, J. ASCENCION MON-TOYA, JOSE ESCOBAR, Instituto Mexicano del Petroleo — Hydrodesulfurization (HDS) catalysts are of great importance in the petroleum industry. Transition metal sulphides catalysts of Ni(Co)Mo(W)/Al2O3 are widely used for hydrotreating reactions, like hydrodenitrogenation and HDS. One of the main issue in these catalysts is to understand the mechanism of the reaction, where MoS2 plays the most important role in the catalytic activity. We studied an industrial NiMo/Alumina sulphide catalyst highly active by using aberration-corrected HAADF-STEM techniques. The used catalysts was a state-of- the art commercial nickel-molybdenum alumina-supported formulation, including organic agent modifier. This type of material belongs to a novel family of catalysts specially designed for ultra-low sulfur production from straight-run gas oil (SRGO), cycle oil, coker gas oil, or their combinations at operating conditions of commercial interest in hydrotreating units at industrial scale. Aberration corrected HAADF-STEM allowed to observe the nanostructure and location of MoS2 and his interaction with the alumina. The results indicate that the MoS2 is highly dispersed on the alumina, however the location of Ni is one of the task of this kind of catalyst.

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