

**ZrO<sub>2</sub>-impregnated macro-mesoporous red mud for catalytic cracking of vacuum residue in steam atmosphere**

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ZrO<sub>2</sub>-impregnated macro-mesoporous red mud catalysts were successfully prepared and introduced for catalytic cracking of vacuum residue in a steam atmosphere. Zirconia dispersed highly in macropore red mud, which had high surface area and highly ordered porous structure dimensions, supplied enough amount of active oxygen species from steam into iron oxide lattice. The obtained catalysts were characterized by the diverse techniques such as nitrogen adsorption, X-ray diffraction, scanning electron microscopy and transition electron microscopy. ZrO<sub>2</sub>-impregnated macropore red mud catalysts showed high activity for catalytic cracking of vacuum residue with steam. The presence of a macroporous structure enhanced the catalytic activity due to better accessibility to the active sites for oxidative cracking and hydrogenation, which induced high conversion and more liquid yield