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Decamethonium bromide-dispersed palladium nanoparticles on mesoporous HZSM-5 zeolites for deep hydrodesulfurization

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Abstract

This article proposes a novel decamethonium bromide-assisted method for modulating the size of supported metal nanoparticles in Pd/mesoporous HZSM-5 hydrodesulfurization (HDS) catalysts. The proposed approach significantly promotes the dispersion of supported palladium nanoparticles by bridging and anchoring the palladium precursor onto the surface of mesoporous HZSM-5 as well as restraining the subsequent aggregation of palladium nanoparticles in calcination. The as-prepared catalyst possessed higher 4,6-dimethyldibenzothiophene HDS activity than its counterpart that was prepared via impregnation due to its smaller Pd nanoparticles, higher Pd dispersion and higher content of Pd⁰ species. This strategy provides a simple pathway for preparing supported metal nanoparticles with high dispersion.

Keywords: Pd nanoparticles; Mesoporous HZSM-5; High dispersion; Hydrodesulfurization; Decamethonium bromide.

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