Title: A feasible linker transformation strategy towards the formation of Cu_2O nanoparticles for immobilization in hierarchical CuBTC for adsorption desulfurization

Authors: Feng, Tao; Wang, Ying; Wu, Yi-nan; Kabtamu, Daniel Manaye; L´aszl´o, Krisztina; Li Fengting

Abstract

Hierarchical porosity and the exposure of sufficient active sites are primary features for robust frameworks designed towards efficient adsorption, especially that of large molecules. Herein, we have introduced a powerful strategy called linker transformation to create mesopores and Cu2O nanoparticles in CuBTC simultaneously. Relying on this method, we constructed hierarchically porous CuBTC with tunable pore size distribution, and the crystallinity and stability were maintained after adding transformed linkers. Furthermore, linker transformation promoted the formation of Cu_2O nanoparticles immobilized in the open framework of CuBTC, which exhibited more active sites for sulfur compounds. The hierarchical porous structure enabled easy diffusion of large-sized sulfur compounds, while the small Cu_2O nanoparticles were highly dispersed, which led to highly enhanced desulfurization adsorption performance. The strategy presented here may provide new insights for designing more abundant MOF structures and further expanding their application range.

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