Supporting Information for

Preparation of supported hydrodesulfurization catalysts with enhanced performance using Mo-based inorganic-organic hybrid nanocrystals as a superior precursor

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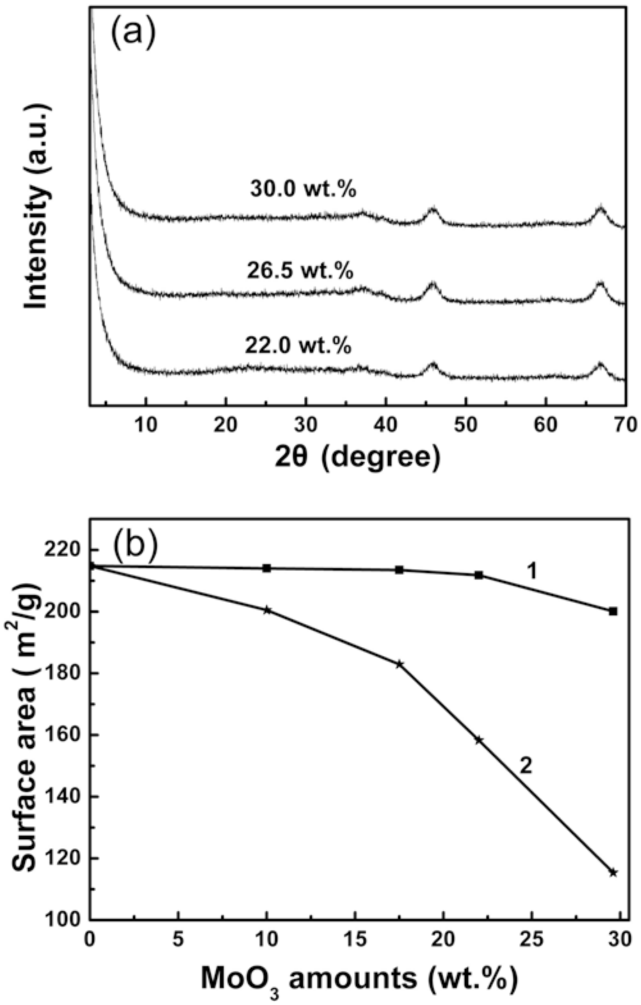
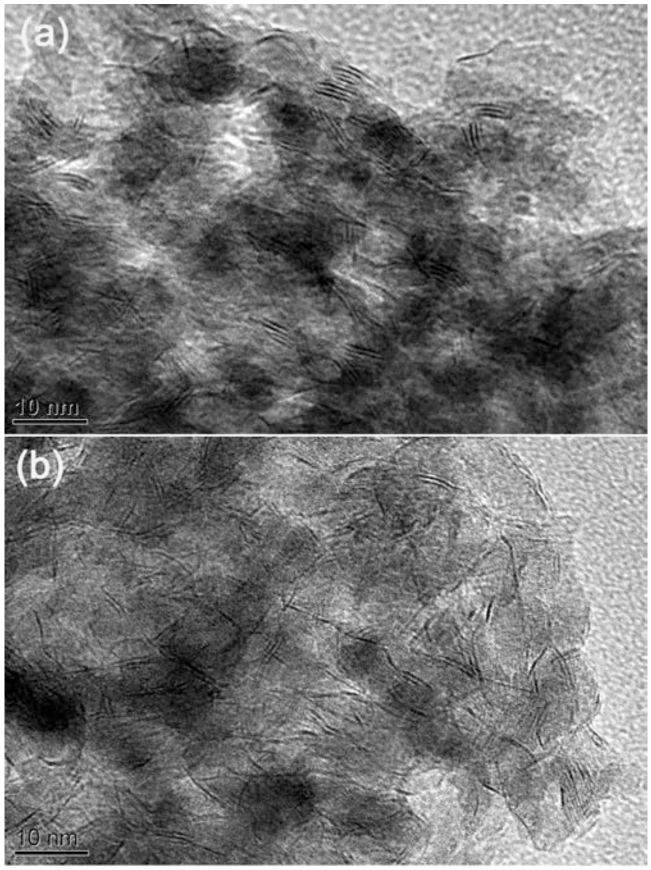


Fig. S1. (a) XRD patterns of Mo/γ-Al_2O_3 catalysts with different MoO_3 loadings prepared via the HNC-assisted method and (b) the change of the surface areas of the catalysts prepared via the different methods as a function of MoO_3 loading. 1, the HNC-assisted method; 2, the conventional impregnation method. From Fig. S1a, we can conclude that the HNC-assisted method not only facilitates the dispersion of MoO_3 on γ-Al_2O_3 but also increases MoO_3 loading, endowing the resulting catalysts with a plenty of potential active sites to reactants. From Fig. S1b, we can clearly see that HA-CATs prepared via the HNC-assisted method have much higher surface areas than IM-CATs with the MoO_3 loading ranging from 0 to 30 wt.%. Meanwhile, with the increasing MoO_3 loading in HA-CATs, the decreases in the surface areas of the resulting catalysts are very small, distinctly different from those of IM-CATs, indicating that the catalysts prepared via the HNC-assisted method possess higher dispersion, more open pore channels and higher accessibility to reactants.



(c)

	Ni-HA-CAT	Ni-IM-CAT
Average slab length (nm)	3.0	5.1
Average stacking number layer	3.3	1.6

Fig. S2. HRTEM images of the catalysts Ni-HA-CAT (a) and Ni-IM-CAT (b) after 300 h hydrotreating reaction using the real coking diesel as feedstock; average length and average stacking number layer of MoS_2 (c) on the two sulfided catalysts after 300 h hydrotreating reaction. Compared with the conventional bimetallic catalyst Ni-IM-CAT, the HNC-derived catalyst Ni-HA-CAT after reaction still kept much shorter slabs, higher stacking layer numbers and thereby possessed better dispersion of MoS_2 nanoparticles and more exposed active sites to reactant molecules.

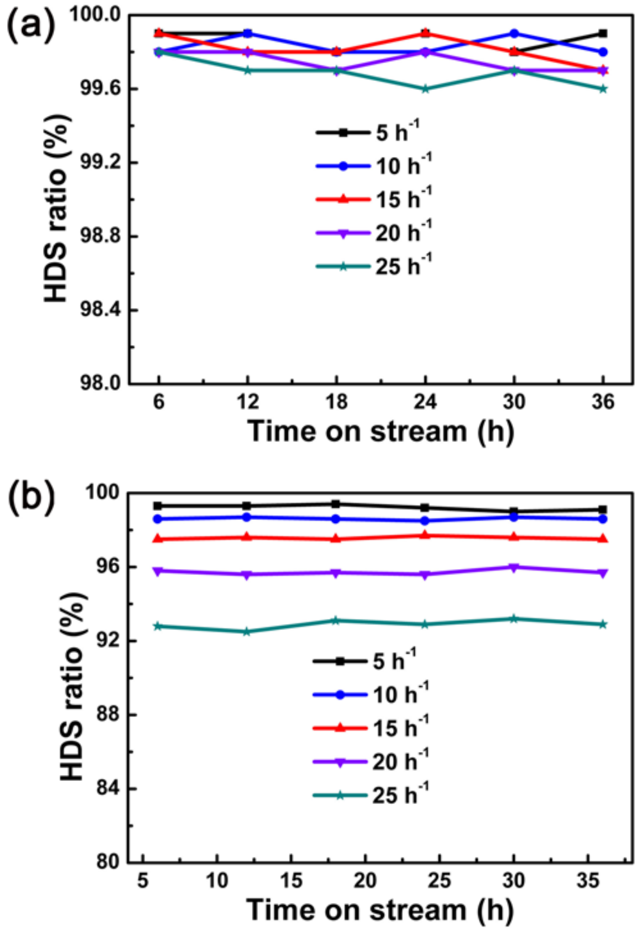


Fig. S3. The DBT HDS activity of Ni-HA-CAT (a) and Ni-IM-CAT (b) at the LHSVs of 5, 10, 15, 20, 25 h^{-1}. Compared with the conventional bimetallic catalyst Ni-IM-CAT, the HNC-derived catalyst Ni-HA-CAT possesses much better stability in its catalytic activity with the increasing LHSV up to 25 h^{-1}.