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Ultrasound-based process makes another promising HDS catalyst

By Chemical Engineering Editorial Staff

In addition to hollow-sphere nanostructured crystals of molybendum disulfide (CE, April p. 15), a highly porous form of MoS2 has also been produced by researchers at the University of Illinois at Urbana-Champaign (edlinks.che.com/4819-541). As was the case with the hollow-sphere version, the porous MoS2 shows "exceptionally high" hyrdodesulfurization (HDS) activity, says chemistry professor Kenneth Suslick.

The porous MoS2 was made by a process called ultrasonic spray pryolysis (USP), which uses a common household humidifier to spray small droplets of precursor solution. The droplets are delivered by a carrier gas into a furnace, where the solvent is evaporated and the dissolved substances react. When a solution containing (NH4)2MoS4 (as a precursor to MoS2) and colloidal silica (as a sacrificial template) is used, a spherical Si02/MoS2 composite is formed (photo, left). The SiO2 is then etched away with hydrofluoric acid, leaving a MoS2 network with a high number of MoS2 edges exposed (the dark fringes of photo, right).

In laboratory trials performed in a single-pass microreactor at 1-atm pressure, the highly porous MoS2 network is found to be higher than that of conventional MoS2, and when promoted with cobalt, higher even than RuS2, an alternative to HDS catalyst more expensive than MoS2. The USP process is said to be easily scaled up, and applicable to other materials.

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