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MESOPOROUS SILICA NANOPARTICLES SYNTHESIZED BY USING TEMPLATING TECHNIQUE

Porous silica nanoparticles were synthesized in this research. TEOS was used as a precursor and three types of surfactant including CTAB, S770 and TTAB, to be used as structure directing agent. To compare the effect of template type on the characteristics of synthetic nanoparticles, molar ratio of precursor to template is equally controlled. The co-condensation combined with a bi-phasic technique was utilized for this synthesis. The as-synthesized particles were incinerated to remove the directing agent at about 500-800 ℃ under atmospheric pressure for 5 h. To confirm the quality of synthesized nano-silica, characteristics of nanoparticles are characterized by several analytical techniques. Morphology, particle size and composition are analyzed by SEM and TEM, while affinity to water is analyzed by measuring the water contact angle at different position on the surface of the obtained particles. Surface area and pore volume are determined by BET technique, while crystallinity and functional groups present in the nanoparticles were analyzed by XRD and FTIR techniques, respectively. Preliminary results showed that the whiteness of silica powder increase as the incinerate temperature is increased. The synthesized silica is approximately 25-35 wt% of the initial weight of substrate. Comparison of the surface area (SA) of calcined and non-calcined particles showed that calcined silica have higher SA than non-calcine silica. As can be seen from SEM and TEM results, the synthesized particles are mesoporous silica nanoparticles.

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