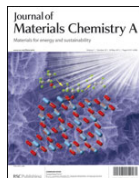


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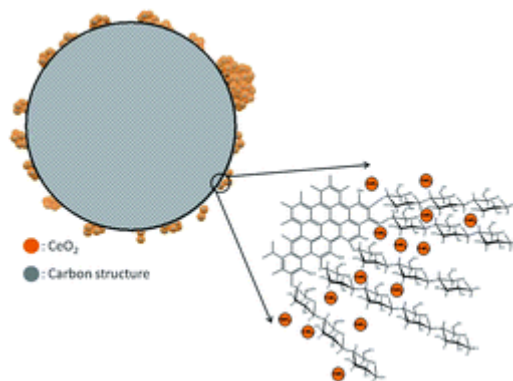
One-pot green synthesis of cerium oxide–carbon microspheres and their catalytic ozonation activity

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Abstract

Monodisperse carbon microspheres surrounded by CeO₂ nanoparticles were prepared by a one-pot green hydrothermal method. The hybrid microspheres were synthesized using a mixed D(+)-glucose and Ce(NO₃)₃ aqueous solution with subsequent hydrothermal treatment at 160 °C for 12 h. The as-prepared material was characterized by X-ray diffraction (XRD), field-emission scanning electron microscopy (FEG-SEM), transmission electron microscopy (TEM) and Fourier transform infrared (FT-IR) spectroscopy. The results showed that microsphere growth is catalyzed by Ce³⁺ ions, for the same hydrothermal treatment period the diameters of hybrid microspheres were 5 μm, 25 times higher than for pure carbon spheres. These hybrid materials exhibited excellent catalytic activity in salicylic acid (SA) degradation by ozone. Ozonation studies showed when the CS20Ce microsphere was used as a catalyst, the mineralization rate of AS reached 80% after 60 minutes of treatment. Cerium oxide–carbon microspheres catalytic activity was attributed to the synergic effect of the carbon and CeO₂ interface structures that were capable of enhancing radical species generation in the ozonation process.

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