SYNTHESIS AND CHARACTERIZATION OF NEW ORDERED MESOPOROUS CARBONS WITH HIGH SURFACE ACTIVITY

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Abstract
Ordered mesoporous carbons with high surface activity (OMC-HSA) have been synthesized via a nanocasting process using SBA-15 as a template and acetylenedicarboxylic acid as a carbon source instead of sugar. The as derived mesoporous carbon materials were characterized by means of X-ray diffraction (XRD), Fourier-Transform infrared(FT-IR), Raman, electron paramagnetic resonance (EPR), transmission electron microscopy (TEM), thermal (DTA/TGA) and surface analysis (BET) methods. The experimental results showed that the new mesoporous carbons exhibit similar basic structural and morphological features with CMK-3 carbons, such as hexagonally ordered structure, narrow pore size distribution (d~3.7nm) and high specific surface area (980m2/g) but their surfaces also possess high content of metal binding sites, such as carboxylate groups, carbonyl and free radicals. The surface charge properties of OMC-HSA were studied using potentiometric acid-base titrations. A surface complexation model revealed two types of H-binding sites inside the slit and cylindrical pores of OMC-HSA. Heavy metal Cd, Pb and Cu uptake was also studied in detail at two pH values (5 and 7) by combination of analytical and EPR spectroscopic techniques. The analytical data indicates an extremely improved capability for Cd, Pb and Cu uptake by the OMCs-HA vs the standard CMK-3.

Keywords: mesoporous carbon, synthesis, surface characterization

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