Melting Behaviors of in-situ Generated V2O5 inside Hexagonally Ordered Mesoporous Silica with Various Pore Diameters

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The melting behaviors of V_2O_5 in confined structures were investigated using the composite of 2-D hexagonally ordered mesoporous silica, designated as SBA-15[1], as host materials and $VOSO_4$ precursors, which are converted to V_2O_5 on heating in air ambient. The mesopore diameter of SBA-15 template was varied from 5.8 to 11.3 nm in order to examine its influence on the melting temperature (T_m) of V_2O_5 mesostructure inside SBA-15. The nanocomposite of SBA-15 template and $VOSO_4$ materials at various heating temperatures were characterized using thermo gravimetric analysis (TGA), differential scanning calorimetry (DSC), X-ray diffraction (XRD), and transmission electron microscope (TEM). T_m of V_2O_5 changed with pore diameters of SBA-15 host and the liquid-like V_2O_5 leads to the breaking of the mesopore structures of SBA-15 at high temperatures. It is attributed to the mechanical stress originated from the inconsistence of capillary forces owing to variable locations of liquid-like V_2O_5 in SBA-15 pore.

참고문헌

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