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Formation of Ruthenium Cluster on Nanocrystalline Tungsten Trioxide

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Abstract

Ruthenium (Ru)-modified (up to 1 wt %) tungsten trioxide (WO₃) samples were synthesized and characterized by X-ray diffraction, X-ray photoelectron spectroscopy (XPS), scanning and transmission electron microscopy, and Raman spectroscopy. Ru was found to form hexagonal clusters on {111} planes of the underlying WO₃ crystals with similar arrangement as is found in metal Ru. XPS revealed that the valence state of ruthenium corresponds to the oxidized state. Results indicate that bonding between Ru and oxygen of the crystal surfaces is a key factor for the cluster formation. No evidence for a crystalline ruthenium oxide or metal phase formation was found instead Ru atoms were bonded on oxygen on the WO₃ {111} planes.

Keywords

KeyWords Plus: SUPPORTED RUTHENIUM; SELECTIVE OXIDATION; OXIDE CATALYSTS; METHYL FORMATE; METAL DIOXIDES; THIN-FILMS; TEMPERATURE; METHANOL; CRYSTAL; RAMAN

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