ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΟΥ ΔΙΠΛΩΜΑΤΟΣ ΕΙΔΙΚΕΥΣΗΣ

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Μεταπτυχιακή Φοιτήτρια

Τμήματος Επιστήμης και Τεχνολογίας Υλικών, Πανεπιστημίου Κρήτης

Επιβλέπων Καθηγητής κ. Γ. Αρματάς

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Περίληψη

Ordered mesoporous tungsten(VI) oxide – vanadium oxide (V_2O_5) nanocomposite frameworks have been successfully prepared *via* a nanocasting method, using NH_2-functionalized mesoporous SBA-15 silica as a hard template. These heterostructures possess a mesoscopic order of discernible domains of parallel-arranged uniform nanorods and exhibit relatively large internal surface area and quite narrow pore size distribution. The chemical composition and mesoporous structure of as-prepared materials were characterized using various techniques such as X-ray diffraction (XRD), transmission electron microscopy (TEM), nitrogen porosimetry and energy dispersive X-ray (EDS), ultraviolet-visible (UV-vis) and Raman spectroscopy. The integration of regular porosity and WO_3–V_2O_5 composition makes these materials highly promising for applications in oxidation catalysis. Our results indicated that the inclusion of V_2O_5 compounds in mesoporous structure has a beneficial effect on the catalytic activity of these materials. Although WO_3 alone show little catalytic activity,

the WO_3–V_2O_5 heterostructures exhibit very high activity in hydrogen peroxide mediated oxidation of 1-phenylethanol under mild conditions. Indeed, the oxidation activity of WO_3–V_2O_5 materials is strongly related to the chemical composition of mesoporous structure, with particular relevance of the V_2O_3 content. Furthermore, the mesoporous WO_3–V_2O_5 catalysts demonstrated remarkable activity and stability for the oxidation of selected *para*–substituted benzyl alcohols, giving good-to-high yields to the corresponding carbonyl compounds (ca. 63 – 82%) within a short reaction time (0.5 – 1 h).