4036374 SCAI/M : MAJOR : APPLIED ANALYTICAL AND INORGANIC CHEMISTRY; M.Sc. (APPLIED ANALYTICAL AND INORGANIC CHEMISTRY)
KEY WORDS : SOL-EMULSION-GEL/ ZIRCONIA/ VANADIUM/ THAI ZIRCON SAND

TANAKORN RATANA: SOL-EMULSION-GEL PREPARATION AND PHYSICAL CHARACTERIZATION FOR ZrO_2 AND V/ZrO_2. THESIS ADVISORS: WARET VEERASAI Dr.rer.nat., LADDAWAN PDUNGSAP Ph.D., 117 p. ISBN 974-664-318-5

The ultrafine zirconia powders were prepared from Thai zircon sand by using a sol-emulsion-gel (SEG) method. This SEG method is a combination of the sol-gel and emulsion processes. Zirconyl nitrate prepared from Thai zircon sand was a precursor in this process. The powder characterization was investigated by using X-ray diffraction (XRD), Differential Scanning Calorimetry (DSC), Fourier Transform Infrared spectrophotometer (FT-IR) and Electron Microscopic techniques (TEM and SEM). The as- prepared zirconia powders are amorphous, then crystallize into the metastable tetragonal structure at higher temperature. The monoclinic state appears completely at 1350 °C. The crystal size obtained by means of XRD increased corresponding with the higher calcine temperatures. The morphology of the aggregate particles were composed of nanometre-size crystals in loose form. The influence of an ultrasonic agitator demonstrates less formation of agglomerate, but it induces the thermal instability of zirconia powder.

Zirconia-supported vanadium oxide was successfully obtained also by the SEG method. The various vanadium contents and calcine temperatures were investigated. Phase transition of zirconia support shifts to lower temperature due to the effect of the interaction between vanadium and zirconia. The surface morphology of V/ZrO_2 exhibits a needle form of V_2O_5 crystals at high calcine temperature. This result was confirmed by infrared spectra when vanadium content exceeds monolayer on zirconia surface.