ASSOCIATION BETWEEN THE DEFECT STRUCTURE OF MECHANICALLY ACTIVATED MoO_3 AND THE CHEMICAL ACTIVITY OF MICs Al/MoO_3

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Abstract: To study defect structure of mechanically activated MoO_3, different techniques (electron spin resonance, Raman spectroscopy, X-ray diffraction, and adsorption/desorption) have been used. There are two stages of mechanical activation of MoO_3: split and friction. On the split stage, the particle size decreases to 60 nm and the specific surface area increases to 30 m^2/g. During the stage of friction, the specific surface area does not increase but the value of microstrains as well as concentration of paramagnetic centers grow. Friction induces phase transition from equilibrium orthorhombic to metastable monoclinic phase. It has been shown that release of oxygen from mechanically activated MoO_3 arises when temperature increases above 230–250 °C. Release of oxygen occurs simultaneously with annealing of paramagnetic centers and microstrains and with formation of structures which are the precursors of crystallographic shear. It is suggested that oxygen is released as the result of distorted $Mo(O_2)–O–Mo(O_2)$ bonds breaking.

Keywords: mechanical activation; ball milling; MoO_3; metastable intermolecular composites (MICs); defect structure

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