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Electron-Beam-Induced Structural Variations of Divanadium Pentoxide (V₂O₅) at Liquid Helium Temperature

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Abstract

The electron-beam-induced changes in V₂O₅ crystals were investigated by means of electron microscopy at liquid helium temperature (4.2 K). We obtained high-resolution images of this system, but observed an amorphization process during a prolonged exposure to the electron beam. The average oxidation state of the amorphous phase was estimated to be about 4+. This phase was stable at room temperature, but a partial recrystallization occurs by further irradiation at room temperature and it can be reduced to VO. These observations are discussed with respect to the reduced diffusion rate of oxygen and lattice collapses at this very low temperature.