

Electron beam induced changes in transition metal oxides

D.S. Su

Department of Inorganic Chemistry, Fritz Haber Institute of MPG,
Faradayweg 4-6, D-14195 Berlin, Germany

Abstract

Electron beam induced changes in maximum valence transition metal oxides V_2O_5 , MoO_2 and TiO_2 (anatase) were studied by means of electron energy-loss spectroscopy and electron diffraction in a transmission electron microscope. For V_2O_5 , the observed chemical shifts of the L -edge reveal the reduction of V^{5+} to V^{2+} , while its structure changes from orthorhombic V_2O_5 to cubic VO. The orthorhombic MoO_3 can be reduced to a phase with an oxidation state lower than that in MoO_2 . This phase has a cubic or tetragonal structure with $a = c = 0.408$ nm. For TiO_2 (anatase), no noticeable changes in the intensity of the O K -edge can be observed. The main structure symmetry prevails during the electron irradiation.