Optical, Structural and Electrochemical Properties of CeO$_2$–Al$_2$O$_3$–SiO$_2$ Thin Films

DURSEN SAYGIN HINCEWSKI, Istanbul Technical University (I.T.U.), MICHAEL HINCEWSKI, TUBITAK Bosphorus Univ. Feza Gursey Institute, IDRIS SORAR, ESAT PEHLIVAN, FATMA Z. TEPEHAN, I.T.U., GALIP G. TEPEHAN, Kadir Has Univ. — CeO$_2$ thin films can be used as counter-electrodes in electrochromic devices, but have the disadvantage of slow reaction kinetics. Thus research has shifted to composite CeO$_2$ films as more promising ion-storage candidates. In this work, we examine the sol-gel coating and characterization of CeO$_2$–Al$_2$O$_3$–SiO$_2$ transparent thin films deposited onto glass microslides and indium-tin-oxide-coated conducting glass. We investigate the evolution of the surface morphology, and the optical, structural and electrochemical properties of the films with varying Si-Al-Ce mol ratios. In particular we find the formation of novel complex phase-segregated structures at the surface, which have the potential for enhancing Li ion insertion/extraction.