Room temperature epitaxial growth of (001) CeO2 on (001)LaAlO3 by pulsed laser deposition

何焱騰,張國樞,劉國成,Li-Zen Hsieh,梁美惠
Center for General Education
General Education Committee
liang@chu.edu.tw

Abstract

The room temperature epitaxial growth of CeO2 on lattice matched (001) LaAlO3 substrates by using pulsed laser deposition (PLD) method under various oxygen partial pressure (Po2) is demonstrated. X-ray diffraction analysis with 2-Theta/rocking curve/Phi-scan, cross-sectional transmission electron microscopy with selectedarea diffractions are used to characterize structural of grown films. The epitaxial (001) CeO2 can be achieved at room temperature under Po2 less than 2 × 103 Torr. The best quality of grown film is obtained under Po2 = 2 × 105 Torr and degraded under Po2 = 2 × 106 Torr due to oxygen deficiency in structure. The epitaxial relationship between CeO2 and LAO is confirmed to be (001)CeO2 //(001)LAO, [100]CeO2//[110]LAO and [010]CeO2//[¯110]LAO.No obvious reduction reaction occurred, from Ce+4 turned into Ce+3 states, as reducing oxygen partial pressure during growth by PLD.

Keyword：CeO2, room temperature epitaxy, PLD, LAO, XPS.