Structure Analysis of $BaTiO_3$ Film on the MgO(001) Surface by Time-Of-Flight Impact-Collision Ion Scattering Spectroscopy

Yeon Hwang[1], Tae-Kun Lee[1] and Ryutaro Souda[2]
[1] Department of Materials Science & Engineering, Seoul National University of Technology, Seoul 139-743, Korea
[2] Advanced Materials Laboratory, National Institute for Materials Science, 1-1 Namiki, Tsukuba, Ibaraki 305, Japan

Time-of-flight impact collision ion scattering spectroscopy (TOF-ICISS) was applied to study the geometrical structure of the epitaxially grown $BaTiO_3$ layers on the MgO(100) surface. Hetero-epitaxial $BaTiO_3$ layers can be deposited by the following steps: first thermal evaporation of titanium onto the MgO(100) surface in the atmosphere of oxygen at 400℃, secondly thermal evaporation of barium in the same manner, and finally annealing at 800℃. Well ordered perovskite $BaTiO_3$ was confirmed from the ICISS spectra and reflection high electron energy diffraction (RHEED) patterns. It was also revealed that $BaTiO_3$ had cubic structure with the same lattice parameter of bulk phase.

Key words: Atomic structure; $BaTiO_3$ epitaxial layer on MgO(100); Impact-collision ion scattering spectroscopy; Reflection high energy electron diffraction

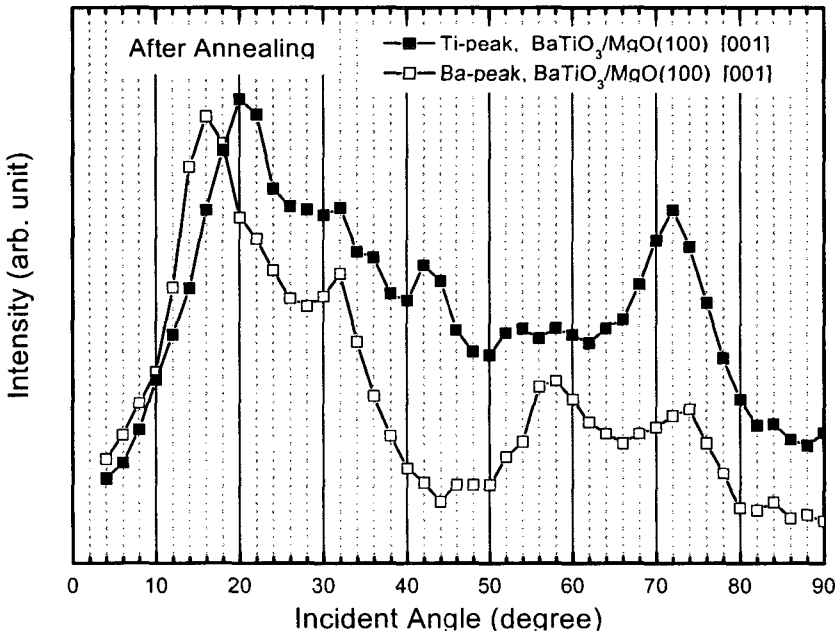

Fig. Polar angle scan of Ti and Ba peak intensities in TOF-ICISS along the [001] azimuth at the $BaTiO_3$ deposited MgO(100) surface after annealing at 800℃.