455. Title:Dielectric function and the crystal structure of MeV ion implanted LiNbO3
Authors:Ogiso, Hisato (1); Nakano, Shizuka (1); Nakada, Masafumi (2)
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Abstract:The behavior of the dielectric functions of MeV ion-implanted LiNbO3 was studied using THz spectroscopy. Single crystal LiNbO3 specimens were implanted with 3 MeV Au ions at four different levels of ion fluence (1 × 1012, 1 × 1013, 1 × 1014 and 1 × 1015 cm- 2). The optical spectra of the specimens were then measured in two ranged values: (1) reflectance THz range spectra from 40 to 700 cm- 1 and (2) reflectance ultraviolet, visible, and near-infrared spectra from 250 to 2000 nm. The THz spectra were analyzed by fitting with the dielectric function model proposed by Brendel. The dielectric function model explained well the experimental spectra of the ion-implanted LiNbO3. The dielectric function shows that the ion-implanted layers were amorphous phase at the fluence of 1 × 1014 and 1 × 1015 cm- 2, whereas the layers at 1 × 1012 and 1 × 1013 cm- 2 maintained the crystal phase but significantly suppressed the phonon resonances. The volume of ion-implanted layers expanded about 8% with the fluence of 1 × 1014 and 1 × 1015 cm- 2, i.e. after amorphization, These results show that the ion implantation significantly affected the lattice vibration mode and the structure even at very low ion fluence.