

Anomalous Surface Peaks Observed in the Backscattering Spectra from Amorphous Si and SiO₂ Films for Medium Energy He Ions

Yoshiaki Kido, Yasushi Hoshino and Tomoaki Nishimura

Abstract

Anomalous surface peaks were first observed in the backscattering spectra for 60 - 110 keV He⁺ incidence on amorphous Si(40 Å) and SiO₂(10-70 Å) films grown on Si(001) substrates. Our toroidal electrostatic analyzer with a monolayer depth resolution made it possible to detect the surface peaks, which can be explained well from nonequilibrium charge exchange processes near the surface regions. The peak height and width provide the quantitative information about the local electron capture and loss cross sections at the surface together with the charge exchange region from the top atomic plane toward the vacuum side. The electron capture and loss cross sections derived are compared with those for gaseous targets and the charge exchange region near the surface is discussed in the context of the surface stopping powers.