

Front cover

The figures shown on the front cover represent a relativistic effect on the inelastic partial cross-section of electron beam for carbon K-shell excitation in a thin graphite film.

The upper figures show energy-filtered diffraction patterns obtained at the incident electron energy of 1000keV (a) and 400keV (b), respectively. The intensity of the 1000keV pattern is distributed in a smaller scattering angular region than that of the 400keV pattern. It should be noticed that the intensity maximum is observed in both cases.

The lower figures show the corresponding intensity profiles along the radial direction of the energy-filtered diffraction patterns of (a) and (b). The solid line illustrates the theoretical profiles including the relativistic term and the dashed line represents the non-

relativistic Lorentzian profile. The experimental intensity profiles indicated by the dots agree well with the relativistic ones. When the scattering angle increases, the intensity distribution approaches the non-relativistic Lorentzian distribution. The deviation from the non-relativistic profile is remarkable at higher incident energy and also at smaller scattering angle. These results prove directly the validity of the prediction of relativistic inelastic scattering theory.

The values of partial cross-section for carbon K-edge at 1000keV are concluded to be larger than those at low energy electrons, which suggests that high sensitivity for detecting an element is expected for high voltage electron energy-loss spectroscopy and energy-filtered imaging.