

Theoretical Study of Plasmon Losses from Li 1s level in Core-level Photoemission Spectra

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Abstract

Typical core-level X-ray photoemission spectra have plasmon loss bands in addition to a main sharp band. The loss of energy from the photoelectron may simultaneously occur in the excitation process (intrinsic loss) or when the photoelectron travels in the solid on its way out through the surface (extrinsic loss). They can interfere each other so these two loss mechanisms are not possible to separate. The quantum Landau formula which originally derived by Hedin *et al.*, can explain overall plasmon loss features accompanied by core level photoemission where elastic scattering before and after the losses are completely neglected.

We calculate plasmon loss features associated with Li 1s photoemission using the quantum Landau formula that includes elastic scattering before and after the losses. Li is light and a weak scatterer, however we observe a prominent effect due to elastic scatterings from surrounding atoms. We also have found that the elastic scatterings can considerably change the relative intensities of bulk and surface plasmon peaks.