High resolution X-ray diffraction in extremely asymmetrical condition

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Grazing Incidence X-ray Reflectivity is a reliable method to investigate electron density distribution on thin films. For estimation of crystalline structure of thin films the X-ray diffraction method is applicable. But often these techniques are not sensitive to a very thin structures like 2D graphene layer or amorphous layer on top of solid substrates.

We present a way to analyze the surface structure of a single crystal using the combination of X-ray reflectivity and diffraction techniques within unique mathematical formalism. The intensity of specular reflection of X-ray wave within the small incident angle near the total external reflection, perform anomalous oscillations near the in-plain Bragg diffraction conditions. These oscillations are sensitive to a surface amorphous layer. We will discuss the unitization of enhancement effect of grazing incidence geometry to surface diffraction as well as influence of crystallinity of surface layer on X- ray reflectivity.

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