

TOTAL REFLECTION OF X-RAYS IS AN INTERFERENCE EFFECT

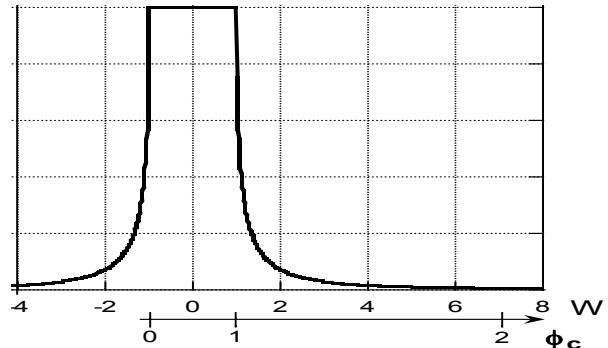
Jun KAWAI

Department of Materials Science and Engineering, Kyoto University

In a popular Japanese X-ray diffraction text book for university students [1], it is clearly described that the diffraction and the reflection are completely different in such a way that: (1) The diffracted X-rays by the crystal are formed by scattering from all the atoms irradiated by the incident X-rays, but visible light is only reflected by the surface thin layer. (2) Monochromatic X-ray diffraction by a crystal takes place at a particular angle according to the Bragg's condition, but the visible light reflection takes place at any angle. (3) The reflection by a mirror is about 100 %, and the intensity does not decrease due to the reflection, but the diffracted X-ray intensity is extremely weaker than the incident X-rays.

However, in the present Poster, I would like to claim that the X-ray diffraction and the X-ray total reflection are exactly the same interference, i.e. diffraction, phenomena. Similar claim can be already found in Refs.[2] and [3].

The consequence of the above discussion will be: (1) the similarity between the total reflection intensity profile and the Darwin profile (as shown in the figure [4]), as well as (2) the width estimation of the flat surface required for the total reflection of X-rays



References

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- [2] T. Takahashi and S. Nakatani: Surf. Sci. **326**, 347 (1995).
- [3] R. P. Feynman: "QED: The Strange Theory of Light and Matter", Princeton Univ. Press (1985).
- [4] J. Kawai: J. Surf. Sci. Soc. Jpn., 22, 397 (2001).