Keynote Lecture

KN31

A modulation wave approach to the long range order hidden in nominal 'disorder'

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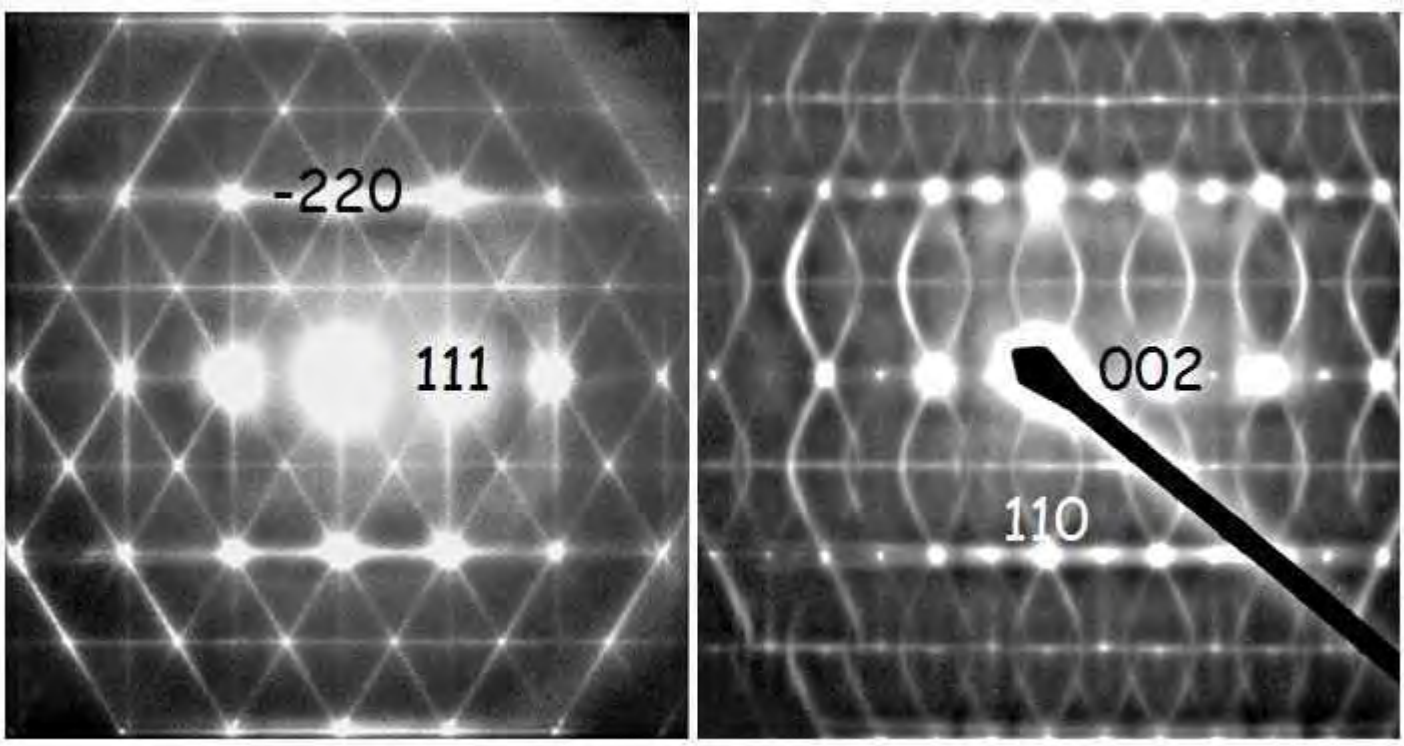
While the definition of a crystal in terms of pure point diffraction/sharp Bragg reflections only is undoubtedly an excellent approximation for many crystalline materials, there exists a large and growing family of phases for which such a description is grossly inadequate: namely crystalline materials whose reciprocal spaces exhibit highly structured, continuous, diffuse intensity distributions which are essentially long range ordered in at least one or more dimensions (see e.g. Fig.1). To gain insight into both the local order, as well as the long range order, hidden in disordered materials of this type it is very helpful, if not essential, to use the language of modulated structures. An approach of this type automatically emphasizes the close relationship between the crystallography of disordered structures and aperiodic crystallography in general. In this contribution, the use of such an approach to understand the often highly structured shapes of such diffuse distributions, the characteristic extinction conditions frequently associated with them and the long range crystal chemical rules underlying their existence will be highlighted. Fig.1: <11-2> and <-110> zone axis electron diffraction patterns of (a) β-cristobalite and (b) SiO_2-tridymite.



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