The nanocrystallography revolution: A dedicated device for 3D-Electron Diffraction experiments on nanocrystals

Danny Stam[1], Arianna Lanza[1], Gustavo Santiso-Quinones[1], Eric Hovestreydt[1]

[1]Eldico Scientific AG, CH-5234 Villigen, Switzerland

stam@eldico.ch
www.eldico-scientific.com

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Abstract: 3D-Electron Diffraction (3E-ED) is a very powerful tool for the structural elucidation of nanocrystalline particles. After the Science nomination for "Breakthrough of the year 2018",[1,2] 3D-ED using the continuous rotation method and X-ray crystallographic software, is gaining a lot of attention in all fields of research. Pioneers in the field of electron crystallography see this as the nanocrystallography revolution.[3]

In the past years, many achievements using electron diffraction techniques have been made in the fields of organic and inorganic molecules, polymorphism, geological sciences, natural products, biomolecules, material sciences, energetic materials, batteries, and many others.[2,4] Such experiments are done in a (modified)-Electron Microscope. Though the realization of such experiments still requires plenty of expertise and efforts and it cannot be applied on daily bases by everyone. Pioneers in the field of Electron Diffraction and researchers of other fields all agree[5] that a dedicated device for the realization of such experiments, would be of great advantage for all fields of nano-crystallography. Though such a device doesn´t exists (up to now) at all. Therefore, it is a necessity that such a device could be made available for the realization of this exciting field of research. Here will present a new device which is dedicated exclusively for such purposes: nanocrystallographic experiments. The device, an Electron Diffractometer, is built and optimized for diffraction experiments of nanocrystalline systems. Furthermore, it uses exclusively the crystallographic approach (continuous rotation method) and crystallographic software. We will showcase this new device and its ease of use and present experimental examples carried out on this device for compounds relevant for industry and research facilities.

References

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