THE ´WHY´ AND ´HOW´ OF A DEDICATED ELECTRON DIFFRACTOMETER:

A user-friendly device for nano-crystallography experiments

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Introduction:

For some reason, no dedicated Electron Diffractometer has been available commercially so far. Data quality would greatly benefit from a setup that focuses on the *diffraction* capability over imaging and allowing for faster and more complete datasets[1].

ELDICO´s objective has been to create a system by scientists for scientists, paying special attention to the performance, versatility and ease-of-use, which resulted in the smart combination of a 5-axis, 360° rotation, nanometer-precise goniometer and an electron beam of radically simplified design, showing that measurements indeed provide good results and structures can be solved ab-initio.

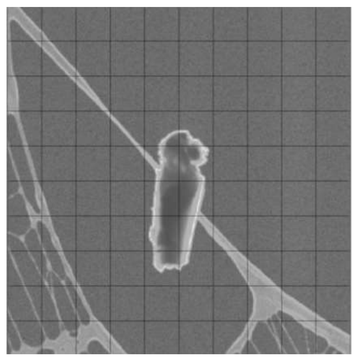
Unique properties:

- Device optimized for diffraction experiments
- Low dose for beam-sensitive materials
- Stable goniometer for precise nano rotation
- Hybrid-pixel detector for fast acquisition of data

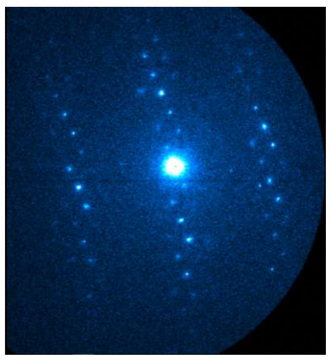
Unique benefits:

- As-easy-to-use-as single-crystal X-ray diffraction
- Straightforward to install – no special requirements
- Sample size from 10 to 1000 nm
- R_1 down to 10 %

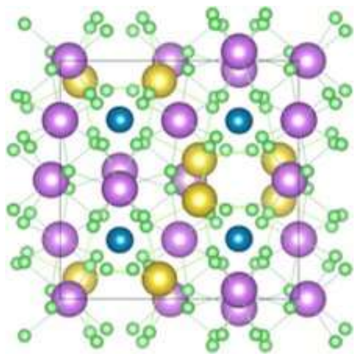
First structure obtained on our device: proof of concept



Crystal (STEM/BF)



Diffraction pattern



Structure

$Na_2Ca_3Al_2F_{14}$

- acceleration: 160kV
- 600 frames: 0.2° / 0.1 sec each
- unit cell: a = b = c = 10.22(1) Å
- space group: $I2_13$
- structure solution: Superflip[2]

[1] M. Gemmi, E. Mugnaioli, T. E. Gorelik, U. Kolb, L. Palatinus, P. Boullay, S. Hovmöller, J. P. Abrahams; ACS Cent. Sci., 2019, 5, 1315-1329.

[2] L. Palatinus, G. Chapuis; J. Appl. Cryst., 2007, 40, 786-79.