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Structure Determination of Nanocrystalline MOFs Using Electron Diffraction

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Electron diffraction (3D-ED, MicroED) is gaining more and more momentum as a technique for the structural elucidation of challenging compounds as it bypasses the main limitation of growing crystals of suitable size for single-crystal X-ray diffraction. As such it has already found applications in all fields of research from organic and inorganic compounds, over polymorphism, pharmacology, natural products, geological sciences, biomolecules, materials science to energy-storage materials and others.

As porous materials commonly obtained from solvothermal synthesis MOFs often pose a challenge for traditional X-ray crystallography as their inherent properties do not allow for a recrystallisation, which makes structural analysis dependent on obtaining suitable single crystals straight from the synthesis. Being able to use nanocrystalline as synthesized material makes electron diffraction the perfect tool to tackle this problem and determine structures from crystals that are too small even for synchrotron facilities.

We show a range of examples from recent literature measured on our ED-1 electron diffractometer demonstrating the reliability and potential of 3D-ED for applications in the field of porous coordination compounds and benefits of a dedicated electron diffractometer.

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