**High-throughput electron diffraction techniques accelerate the development of zeolite materials**

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Knowing the structures of zeolite materials is essential for understanding their properties and designing new materials for targeted applications. However, the characterization of zeolites, often synthesized as polycrystalline and multiphasic mixtures, presents significant challenges when using conventional single-crystal and powder X-ray diffraction techniques. In contrast, electron diffraction offers unique advantages for studying nano- and micrometer-sized crystals that are too small for single-crystal X-ray diffraction or too complex for powder X-ray diffraction.[1]

In this talk, I present several high-throughput electron diffraction techniques, including continuous rotation electron diffraction (cRED) [2], serial electron diffraction (SerialED) [3], and serial rotation electron diffraction (SerialRED) [4] developed in my group. I will demonstrate their impacts on the structure characterization of zeolites and other porous materials [5-9]. Our methods not only provide accurate 3D atomic positions but also reveal detailed structural features at atomic scale, such as framework composition, location of guest molecules, and disorders in the crystals.

Today, structure determination of zeolites and other nanoporous materials using 3D ED is as feasible and accurate as traditional single-crystal X-ray diffraction. A complete 3D ED dataset can be obtained in less than a minute on a standard TEM. To further enhance the efficiency and accessibility of these techniques, we have developed high-throughput automated data collection and analysis pipelines. These pipelines enable the study of extremely beam-sensitive crystals, facilitate phase analysis, and allow for the detection of minor phases that are undetectable by X-ray diffraction [9]. We envision that these automated workflows will transform electron diffraction into a fast, reliable, and high-throughput materials characterization technique, accessible even to non-experts in TEM and crystallography. We foresee the advance of electron diffraction techniques to accelerate the discovery of novel structures and new materials for various applications.

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