

Opening the Door to Synchrotrons and High-quality Powder Diffraction: A Journey of Increasing Access

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Modern materials science, and in particular materials discovery, requires a fast turn around between synthesis and detailed structural investigations. Often the ability to acquire high quality diffraction data can create a bottleneck for this science. To combat this bottle neck, advances have been made over the years for being able to achieve high resolution powder diffraction, rapid acquisition area detector powder diffraction, and total scattering/PDF measurements over reasonable time frames and of high quality. Advances have been made to expand these capabilities to variable temperature and other in situ possibilities. A perspective, and some science examples, will also be given on approaches and the need for extension to other synchrotron-based techniques, such as SAXS and spectroscopy, as well as neutron diffraction. A more complete set of techniques, capabilities and meta-data, especially with the current need to vast data sets for AI/ML, is a distinct challenge for the material science community of the future.