Instrument manufacturers continue to develop compact instrumentation with a focus on reduced power consumption and smaller footprints - from both a physical and ecological standpoint. Unfortunately, consideration of these instruments is often coupled with the implication that smaller devices necessitate a tremendous sacrifice in data quality. From the perspective of X-ray diffraction (XRD), benchtop diffractometers are frequently viewed as suitable only for "quick and dirty" analyses and limited to simple applications such as phase identification.

This assumption is far from accurate. By coupling clever goniometer designs and modern detector technologies, it is possible to achieve quality diffraction data even from a benchtop instrument. Here, we discuss a wide range of applications in polycrystalline XRD, including quantitative Rietveld refinement, structural modeling, and cluster analysis, using data collected on a compact diffractometer.