Magnetic field induced polymorphism of R_5T_4 compounds

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Structural rearrangements triggered by a magnetic field are rare compared to temperature and/or pressure induced polymorphism. While the latter is routinely probed *in situ* by temperature and pressure dependent powder diffraction, the most common tools employed in detecting magnetic field induced polymorphism remain bulk field-dependent measurements of the physical properties, e.g., the electrical resistance, magnetization and strain. On one hand, discontinuities in these macroscopic properties serve as suitable evidence of a structural phase transition, but on the other hand, they provide no clues about its atomic-scale mechanism. By successfully coupling a rotating anode powder diffractometer with a continuous-flow cryostat and a split-coil superconducting magnet we were able to obtain excellent-quality Rietveld-ready powder diffraction data between 2.5 K and 315 K in 0 to 4 T magnetic fields. This allowed us to study the magnetic field-induced polymorphism in several polycrystalline compounds from the R_5T_4 family, where R = lanthanide metal, T = Si, Ge and/or Sn.

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