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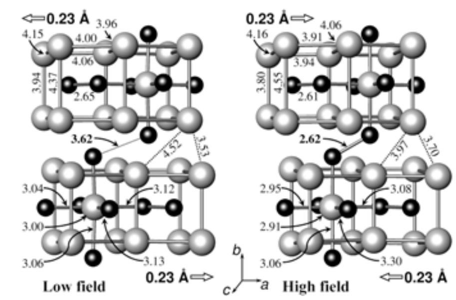
Imaging Magnetic Field Induced Structural Transitions at the Atomic Level. V.K. Pecharsky, Ya. Mudryk, K.A. Gschneidner, Jr., Ames Laboratory, Dept. of Materials Science and Engineering, Iowa State Univ., Ames, IA 50010, USA.

Temperature and/or pressure induced polymorphism is much more common compared to structural rearrangements triggered by a magnetic field. While the former 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 Rietveld-quality powder diffraction data between 2.5 K and 315 K in 0 to 4 T magnetic fields. This allowed us to study the massive magnetic field-induced structural transformations in several polycrystalline compounds from the $R_5Si_xGe_{4-x}$ family, where R = lanthanide metal.



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