SCD

single-crystal diffractometer

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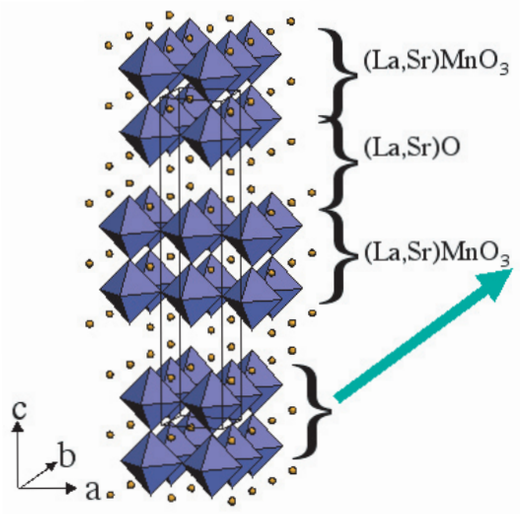
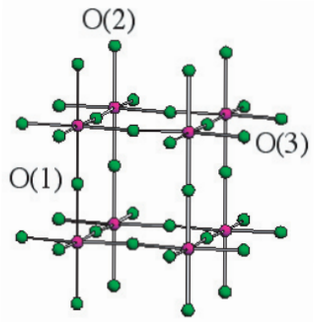
instruments

SCD is used to determine the crystal and magnetic structures of a wide variety of materials. Neutrons are scattered from the crystalline sample onto a ^{3}He-gas-filled area detector that is position sensitive and measures 25 x 25 cm^2. The wavelengths of the neutrons are determined by their time of flight from the source to the detector. To cover all of the reciprocal space for a particular crystal, the sample is mounted on a goniometer. For most crystals, about 10-15 histograms will provide a full data set.

Crystal Structure of $La_{2-2x}Sr_{1+2x}Mn_2O_7$

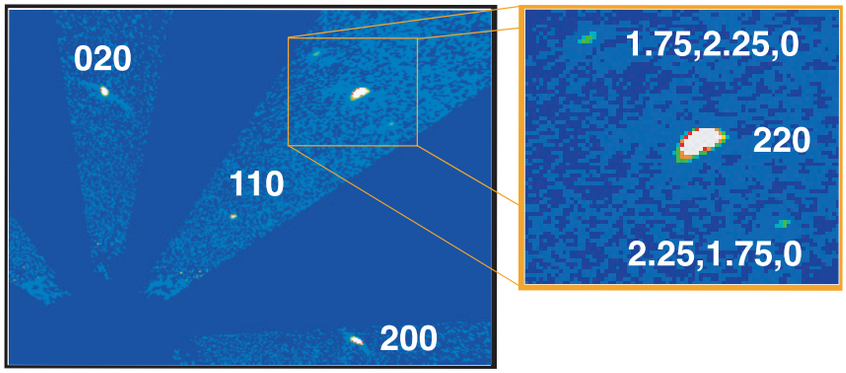




Space Group: I4/mmm
a=3.87 Å, c=20.1 Å

SCD can be used to study the structure of organometallic molecules; crystal-structure changes at solid/solid phase transitions; magnetic spin structures; twinned or multiple crystals; texture in polycrystalline materials; and structural or magnetic modifications of materials under pressures up to 20,000 atm. The instrument measures a large fraction of reciprocal space at one time and therefore can be used for studies of unknown incommensurate structures and diffuse scattering.

Orbital Ordering in $LaSr_2Mn_2O_7$



Super-lattice reflections in $LaSr_2Mn_2O_7$ with propagation vector q = (h+1/4, k-1/4, l) are observed between 210-100 K.

SCD Specifications	
Wavelength range	0.5–10 Å
Beam diameter at sample	1–5 mm
Time resolution	1%
Maximum lattice constant	20 Å
Detector	1 multiwire proportional counter (25 cm x 25 cm) at 90°
Detector resolution	2.5 mm
Moderator	Chilled water at 283 K
Sample environment	10–300 K
Sample size	0.5–10 cm^3
Experiment duration	2 to 4 days per octant of reciprocal space