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Inelastic x-ray scattering measurements to study lattice dynamics of negative thermal expansion material ScF_3 SAHAN HANDUNKANDA, JASON HANCOCK, University of Connecticut, AYMAN SAID, Advanced Photon Source, Argonne National Laboratory, VLADIMIR VORONOV, Kirensky Institute of Physics, Krasnoyarsk, Siberia, UNIVERSITY OF CONNECTICUT TEAM, ADVANCED PHOTON SOURCE, ARGONNE NATIONAL LABORATORY COLLABORATION, KIRENSKY INSTITUTE OF PHYSICS, KRASNOYARSK, SIBERIA COLLABORATION — Thermal expansion is one of the best-known material properties. Although the positive thermal expansion (PTE), a tendency for a solid material to grow when heated, is the most common type, there are some materials which show negative thermal expansion (NTE). NTE is one of the new and exciting fields of materials physics. Strong, thermally persistent, isotropic NTE is unusual and has been observed in only a handful of materials. Here we present inelastic x-ray scattering (IXS) measurement results of single crystal ScF_3 which has strong, persistent NTE down to very low temperature. We observe softening of the phonons responsible for NTE as the temperature is lowered. The low temperature results data also show the appearance of an elastic peak which is especially strong at M and R points of reciprocal space. The results of the experiment may explain an unusual mechanical behavior of the material.

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