

Inelastic Neutron Scatterings Reveal Mechanism for Barocaloric Effects in Plastic Crystals

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Refrigeration is of vital importance for modern society—for example, for food storage and air conditioning—and 25 to 30 per cent of the world's electricity is consumed for refrigeration. Current refrigeration technology, mostly involving the conventional vapour compression cycle, is of growing environmental concern because of large amount of greenhouse gases released into atmosphere every year. As a promising alternative, refrigeration technologies based on solid-state caloric effects have been attracting attention for several decades. However, their application is restricted by the limited performance of current caloric materials, owing to small isothermal entropy changes and large external driving fields. Recently, it has been discovered that a class of disordered solids called plastic crystals can deliver colossal barocaloric effects (CBCEs) (large cooling effects induced by pressure). In this presentation, I will report how inelastic neutron scattering and quasi-elastic neutron scattering, performed on Pelican instrument, can help in understanding the mechanism responsible for the excellent cooling effects of the plastic crystals [1].

[1] Bing Li, et al. Colossal barocaloric effects in plastic crystals, Nature, <https://doi.org/10.1038/s41586-019-1042-5>

Level of Expertise

Expert

Do you wish to take part in the poster slam

No

Travel Funding

No

Speakers Gender

Male

Primary author: YU, Dehong (Australian Nuclear Science and Technology Organisation)

Co-authors: MOLE, Richard (ANSTO); Prof. LI, Bing (Institute of Metal Research, CAS, Shenyang, China)

Presenter: YU, Dehong (Australian Nuclear Science and Technology Organisation)

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