Researchers acquire high-Curie-temperature layered metal halide ferroelectrics via cage-confined ethylamine rotators

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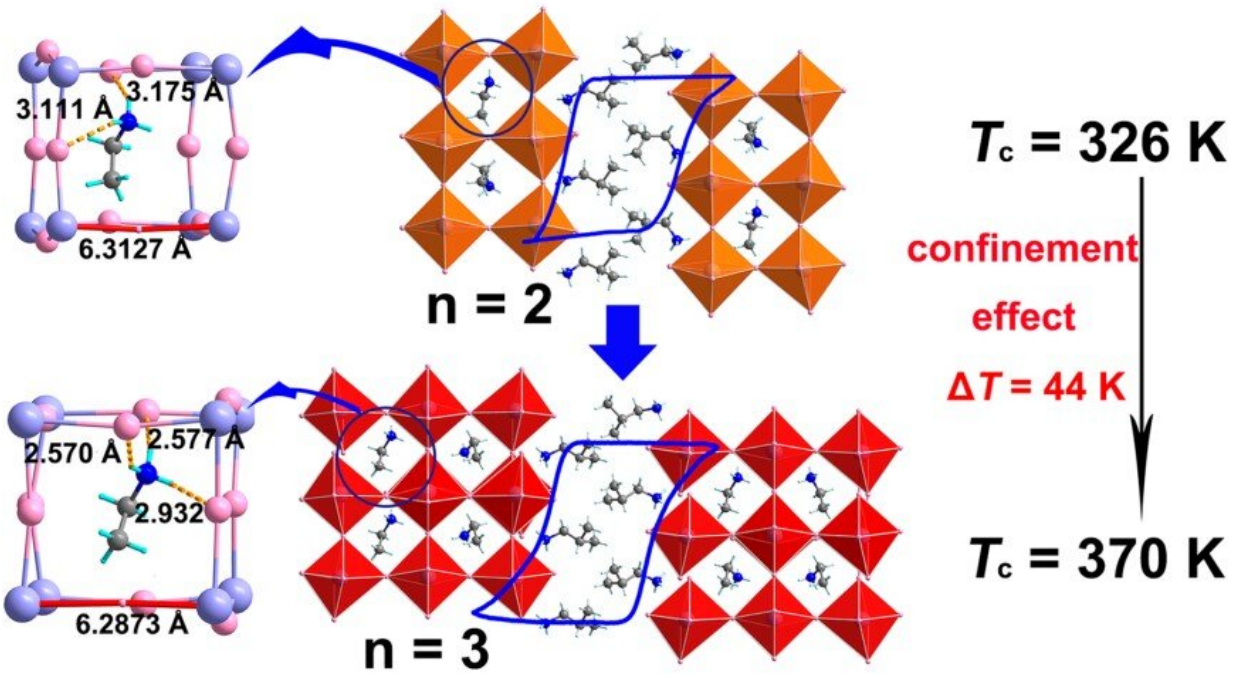

Schematic illustration of the strategy. Credit: Prof. LUO Junhua's group

Two-dimensional (2-D) organic inorganic hybrid perovskite (OIHP) ferroelectrics have attracted much attention due to the combination of spontaneous polarization and excellent semiconducting properties. Nevertheless, how to effectively tune the Curie temperature (Tc)

remains an obstacle to their further development.

The confinement effect, which has shown great success in the molecular dynamics control of guest molecular in some metal-organic frameworks, provides new insights into the Tc-tuning of OIHP ferroelectrics.

In a study published in *Angewandte Chemie International Edition*, a research group led by Prof. Luo Junhua from the Fujian Institute of Research on the Structure of Matter (FJIRSM) of the Chinese Academy of Sciences obtained bilayered and trilayered 2-D OIHP ferroelectrics by incorporating large-size ethylammonium (EA) molecules as cage-confined rotators.

The researchers found that the trilayered compound exhibited a Tc up to 370 K, about 44 K higher than that of bilayered compound (326 K).

Structural and computational analyses suggested that the improvement of Tc was due to the higher phase transition energy barrier arising from the increased cage-confinement effect with increased lead bromide layer thickness.

This study suggests that EA is an effective cage-confined rotator to rationally design 2-D OIHP ferroelectrics, and provides a way to effectively tune the Tc of 2-D OIHP ferroelectrics.

More information: Yu Peng et al. Acquiring High-Tc Layered Metal Halide Ferroelectrics via Cage-Confined Ethylamine Rotators, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202011270

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