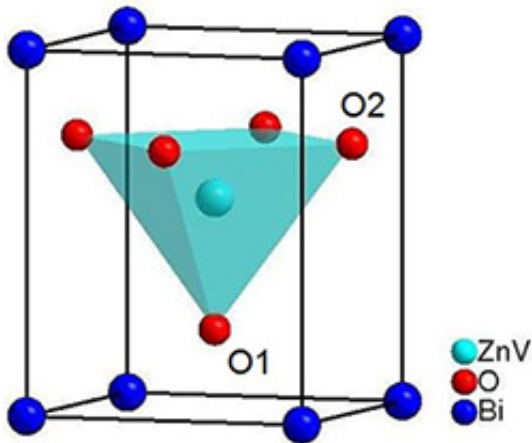


A new PbTiO₃-type giant tetragonal compound for piezoelectric materials

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Crystal structure of Bi₂ZnTiO₆

The solid solution consisting of PbZrO₃ and PbTiO₃, P(Zr,Ti)O₃ (PZT) is the most widely used piezoelectric material due to its excellent piezoelectric properties at morphotropic phase boundaries (MPB) between rhombohedral and tetragonal structures.

There is growing demand for a replacement to PZT because it contains lead-a toxic material. For this purpose, the development of novel lead-free rhombohedral and/or tetragonal polar compounds is crucial.

Now, Yu Runze, Hajime Hojo, Masaki Azuma and colleagues at Tokyo Institute of Technology, and colleagues at Chuo University, and the

Japan Atomic Energy Agency have discovered a new PbTiO_3 -type giant tetragonal compound with the chemical formula $\text{Bi}_2\text{ZnTiO}_6$.

Polycrystalline samples of Bi_2ZnVO_6 were prepared by high-pressure synthesis at 9 GPa and 1100 °C and crystal structures were investigated by synchrotron X-ray diffraction and [transmission electron microscope](#).

Analysis revealed that Bi_2ZnVO_6 has a giant tetragonal distortion of $c/a = 1.26$ and an estimated electrical ionic polarization of $126 \mu\text{C}/\text{cm}^2$. This value of the spontaneous polarization is the largest among PbTiO_3 -type perovskite compounds.

This polar compound with a large tetragonal distortion is a promising candidate for producing high performance lead-free [piezoelectric](#) solid solutions with MPB.

More information: Runze Yu et al. New PbTiO -Type Giant Tetragonal Compound Bi ZnVO and Its Stability under Pressure , *Chemistry of Materials* (2015). [DOI: 10.1021/cm504133e](https://doi.org/10.1021/cm504133e)

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