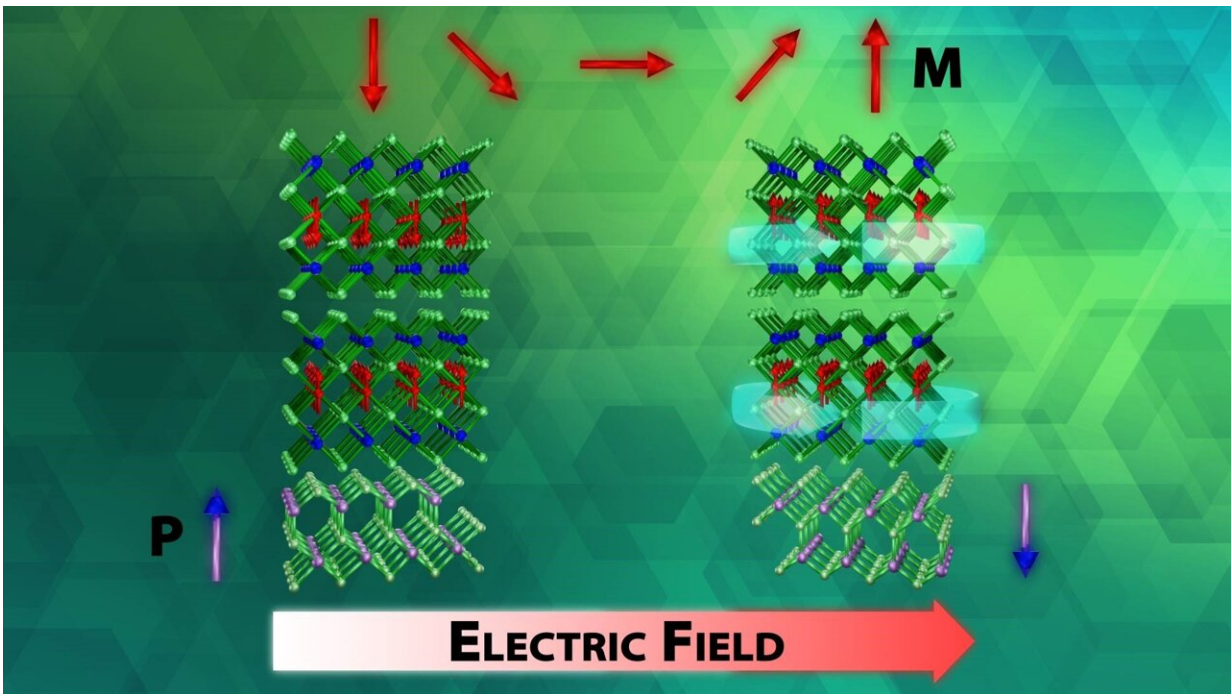


Scientists describe a novel way to manipulate exotic materials

June 20 2023, by Lawrence Bernard



A new method to control quantum states in a material is shown. The electric field induces polarization switching of the ferroelectric substrate, resulting in different magnetic and topological states. Credit: Mina Yoon, Fernando Reboredo, Jacquelyn DeMink/ORNL, U.S. Dept. of Energy

An advance in a topological insulator material—whose interior behaves like an electrical insulator but whose surface behaves like a conductor—could revolutionize the fields of next-generation electronics

and quantum computing, according to scientists at Oak Ridge National Laboratory.

Discovered in the 1980s, a topological material is a new phase of material whose discoverers received a Nobel Prize in 2016. Using only an electric field, ORNL researchers have transformed a normal insulator into a magnetic topological insulator. This exotic material allows electricity to flow across its surface and edges with no energy dissipation. The [electric field](#) induces a change in the state of matter.

The ORNL scientists have published their findings in *2D Materials*.

"The research could result in many practical applications, such as next-generation electronics, spintronics and [quantum computing](#)," said ORNL's Mina Yoon, who led the study.

Such matter could lead to high-speed, low-power electronics that burn less energy and operate faster than current silicon-based electronics.

More information: Wei Luo et al, Non-volatile electric control of magnetic and topological properties of MnBi₂Te₄ thin films *, *2D Materials* (2023). [DOI: 10.1088/2053-1583/accaf7](https://doi.org/10.1088/2053-1583/accaf7)

Provided by Oak Ridge National Laboratory

Citation: Scientists describe a novel way to manipulate exotic materials (2023, June 20) retrieved 29 April 2024 from <https://phys.org/news/2023-06-scientists-exotic-materials.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.