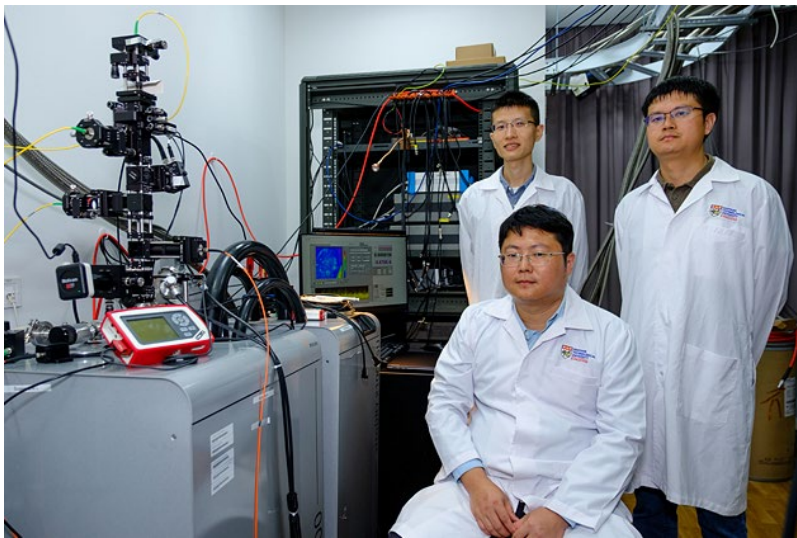


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Translated from Japanese

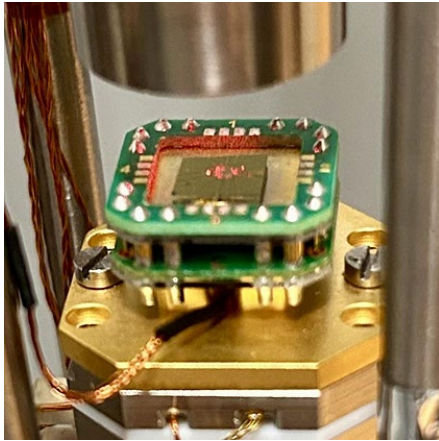
Precise control of the direction of resistive current using light: Nanyang Technological University, Singapore

On March 11, Nanyang Technological University (NTU) in Singapore announced that it had succeeded in precisely controlling the direction of electric current flowing seamlessly through the edges of a quantum material by switching the direction of a magnetic field using light. The research findings were published in the academic journal *Nature*.



Electrons flowing through electronic devices typically generate heat due to resistance. This places a significant burden on cooling in data centres and quantum computers. With the increasing demand for computing power due to the spread of AI, there is growing interest in utilising electric currents that generate almost no heat.

The research team focused on "Moire-Chern ferromagnets," which are made by stacking extremely thin materials of a few atomic layers with slight offsets. This material has an insulating core, while electrons can flow freely at the edges, but the challenge was to precisely control that flow.



Dr. Xiangbin Cai and his colleagues at the Department of Electrical and Electronic Engineering, NTU, demonstrated that by reversing the direction of a magnetic field using circularly polarised light, the direction of electron flow can also be switched. When a light dimmer than that of a portable flashlight was shone on the material, electrons flowing along the edge of the material instantly reversed from clockwise to counterclockwise.

Professor Weibo Gao stated, "This type of light-based current control is very appealing because it allows us to control the direction of the current without requiring physical wiring." Dr. Haiyang Pan explained that this achievement will lead to the exploration of phenomena important for quantum information processing.

https://spap.jst.go.jp/asean/news/260403/topic_na_03.html