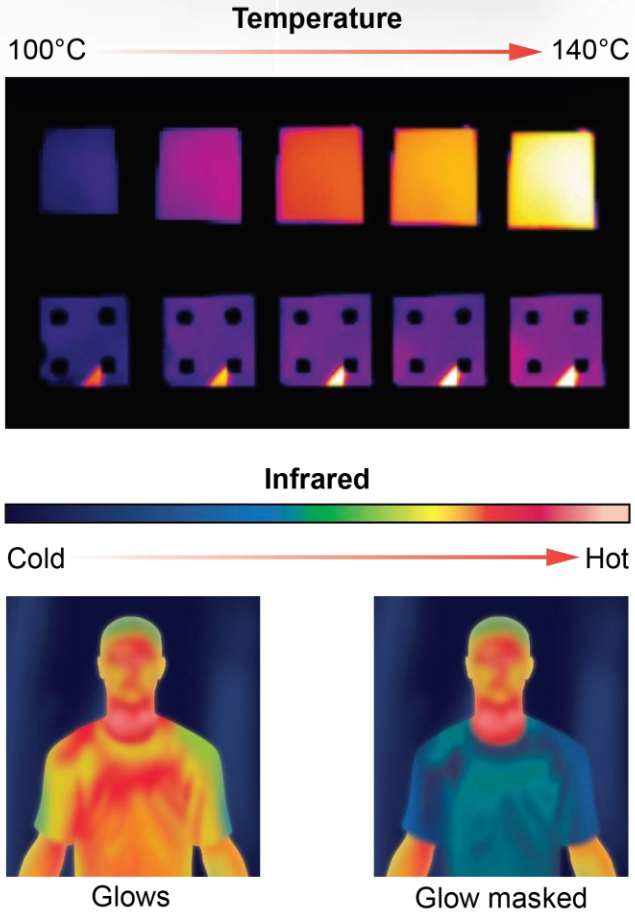
Infrared Invisibility: Controlling Thermal Radiation



(Top) a comparison between the new material and a normal sample. (Bottom) illustration of the principle of infrared camouflage.

Scientific Achievement

For the first time, scientists found a material whose quantum nature enables it to mask its heat properties from infrared cameras.

Significance and Impact

This new result has significant impact on applications such as infrared camouflage, privacy shielding, and other future applications of quantum materials in controlling heat transfer.

Research Details

- Scientists demonstrated that this material undergoes a unique, temperature-driven and hysteresis-free insulator-to-metal phase transition, enabling control of its thermal radiation properties.
- The optical properties change relatively gradually over the temperature range of ~40° to ~140°C.
- This temperature-independent thermal transmission was mapped using the NSLS-II ESM beamline, operated in partnership with CFN, and the CFN Proximal Probes Facility.

A. Shahsafi, P. Roney, Y. Zhou, Z. Zhang, Y. Xiao, C. Wan, R. Wambold, J. Salman, Z. Yu, J. Li, J. T. Sadowski, R. Comin, S. Ramanathan, M. A. Kats. *PNAS* **116** (52) 26402-26406 (2019).

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