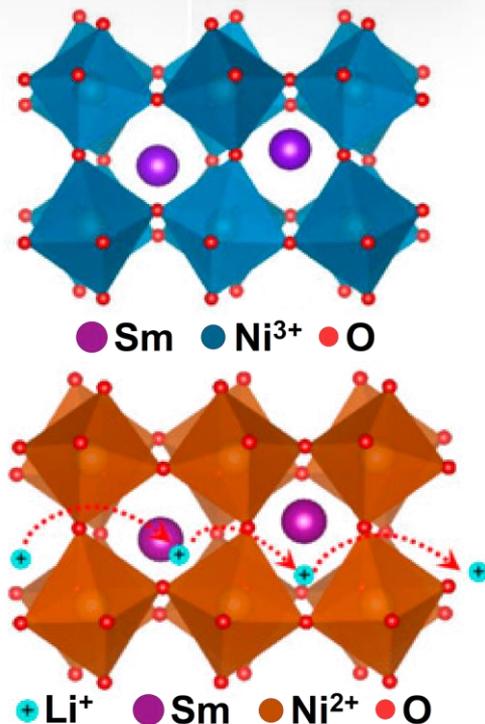


Potential New Ion Conductor Based on Quantum Materials



The top image shows the crystal structure of pristine SmNiO_3 (SNO), which is a narrow-gapped semiconductor at room temperature. When lithiated (Li-SNO), the material becomes both an insulator and a lithium ion conductor, shown in the bottom image.

Scientific Achievement

Scientists create new solid-state ion conductor by incorporating Li ions into rare-earth perovskite nickelates.

Significance and Impact

This ion-conductor has potential applications in electrochemical devices, nonvolatile memory, neuromorphic computing, and biomimicry.

Research Details

- X-ray absorption spectroscopy (XAS) at the APS and NSLS-II's IOS beamline were used to study the behavior of the electrons in the perovskite nickelate.
- High-resolution experimental methods and first-principles calculations provided evidence for ion shuttling in the lattice and the atomistic pathways.

Y. Sun, M. Kotiuga, D. Lim, B. Narayanan, M. Cherukara, Z. Zhang, Y. Dong, R. Kou, C. Sun, Q. Lu, I. Waluyo, A. Hunt, H. Tanaka, A. N. Hattori, S. Gamage, Y. Abate, V. G. Pol, H. Zhou, S. K. R. S. Sankaranarayanan, B. Yildiz, K. M. Rabe, S. Ramanathan. *PNAS*, 1805029115 (2018).

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