

New open-framework allotrope of silicon with improved light absorption

Scientific Achievement

Synthesis of a new crystalline form of silicon (allotrope) using novel high-pressure precursor process.

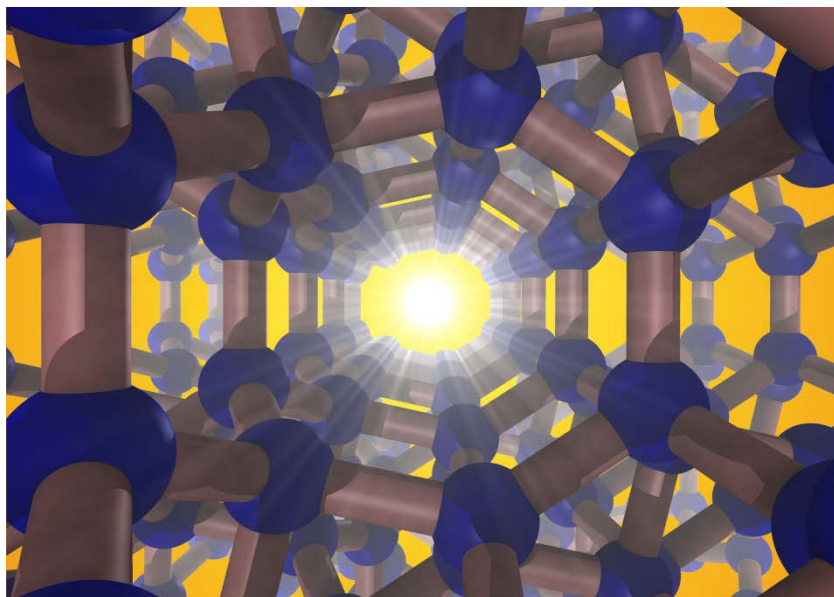
Significance and Impact

The new allotrope has a quasidirect band gap with significantly enhanced visible light absorption properties. In addition, large channels in the structure may provide useful for ion/gas storage and molecular-scale filtering applications.

Research Details

- $\text{Na}_4\text{Si}_{24}$ precursor formed at high pressure and recovered to ambient. All Na atoms removed to form new pure Si phase, Si_{24} .
- Si_{24} was characterized by synchrotron x-ray diffraction, Raman and optical spectroscopies, electrical measurements and first principles calculations made possible by the EFree ERFC.

Facilities: APS, Argonne



Kim, D.Y.; Stefanoski, S.; Kurakevych, O.O.; Strobel, T.A.,
Synthesis of an open-framework allotrope of silicon, doi:10.1038/nmat4140.



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