Nanocages Trap & Selectively Release Elusive Noble Gases

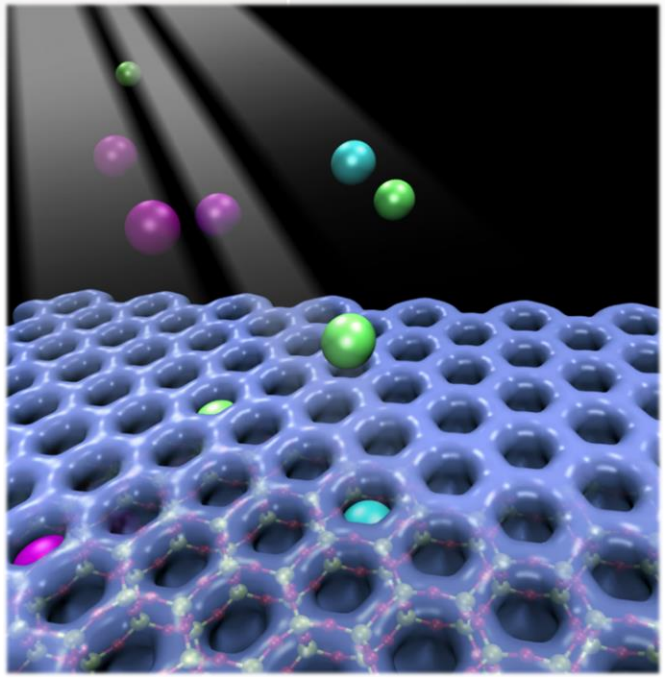

Illustration of individual atoms of Ar, Kr, and Xe getting trapped in a 2D array of hexagonal prism silicate nanocages.

Scientific Achievement

Scientists discovered a mechanism by which nanocages trap single atoms of argon (Ar), krypton (Kr), and xenon (Xe) at room temperature (T) & release them selectively afterwards at higher T.

Significance and Impact

Trapping single atoms of these noble gases at noncryogenic conditions is extremely difficult and an industrially-relevant challenge for energy, environment, and health applications.

Research Details

- The work demonstrates the reduction of the expected trapping barrier by using both x-ray photoelectron spectroscopy (XPS) and density functional theory (DFT).
- This work used the NSLS-II IOS beamline for ambient-pressure XPS measurements and the theory and computation facility at Brookhaven National Laboratory's Center for Functional Nanomaterials.

J.-Q. Zhong, M. Wang, N. Akter, J.D. Kestell, T. Niu, A.M. Boscoboinik, T. Kim, D.J. Stacchiola, Q. Wu, D. Lu, J.A. Boscoboinik, *Advanced Functional Materials* **29**, 1806583 (2019).

Work was performed at Brookhaven National Laboratory