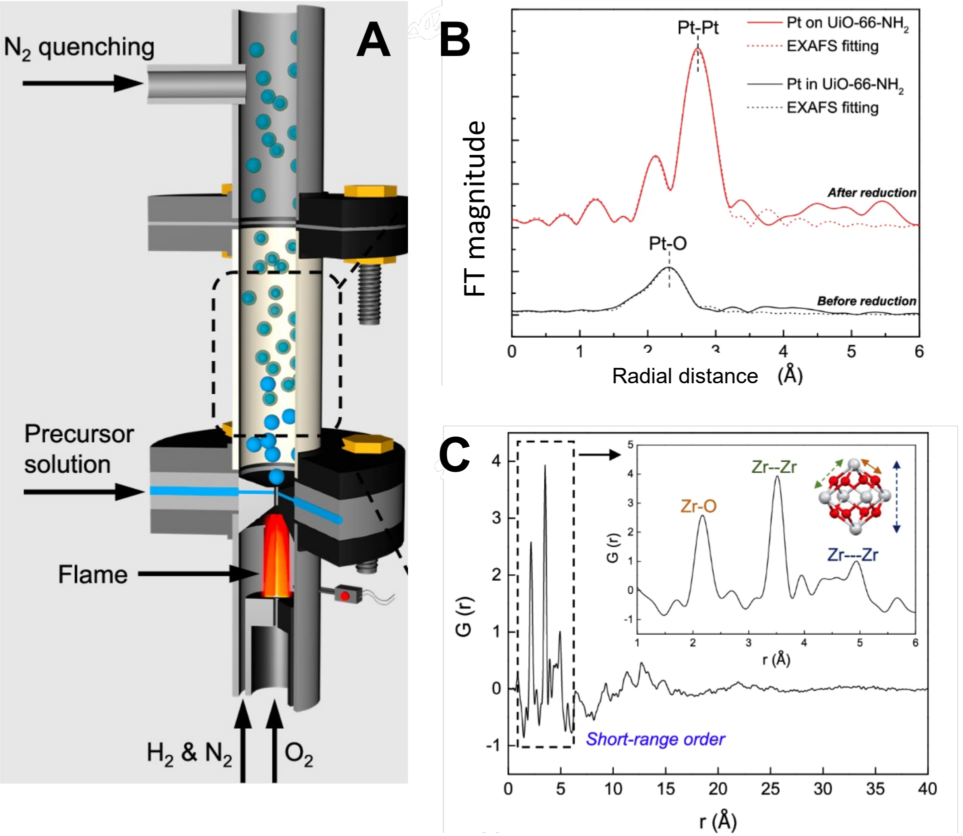
A New Route to Highly Complex, Stable Metal-Organic Frameworks



(A) Visualization of the MOF synthesis process, (B) Extended X-ray Absorption Fine Structure (EXAFS) spectra recorded for Pt/MOF at the ISS beamline, and (C) Pair Distribution Function (PDF) recorded at the XPD beamline for amorphous MOF.

S. Liu, C. Dun, **F. Yang**, K-L Tung, **D. Wierzbicki**, **S. Ghose**, K. Chen, L. Chen, R. Ciora, M. A. Khan, Z. Xuan, M. Yu, J. J. Urban, M. T. Swihart. *Nat Commun* **15**, 9365 (2024). DOI: 10.1038/s41467-024-53678-4

Scientific Achievement

Compared to conventional synthesis methods, where synthesis takes hours, the materials are synthesized within milliseconds - drastically increasing scalability.

Significance and Impact

A faster process for creating complex MOFs that allows accelerated applications in catalysis, biomedicine, and more. The synthesis method is scalable for mass production. Results showed 100% CO conversion at 130°C.

Research Details

- MOFs were fabricated in a continuous flame aerosol process beginning with a liquid precursor of metal ions, organic linker molecules & solvent.
- The approach yields both nano-crystalline and amorphous MOFs, which can integrate different metal cations within the same MOF and can create MOFs with anchored metal nanoclusters – useful in catalysis.
- The MOF structure was studied via several methods, including X-ray techniques at NSLS-II's ISS and XPD beamlines.

Work was done in part at NSLS-II

University at Buffalo | BERKELEY LAB | Brookhaven National Laboratory | AGH University of Krakow