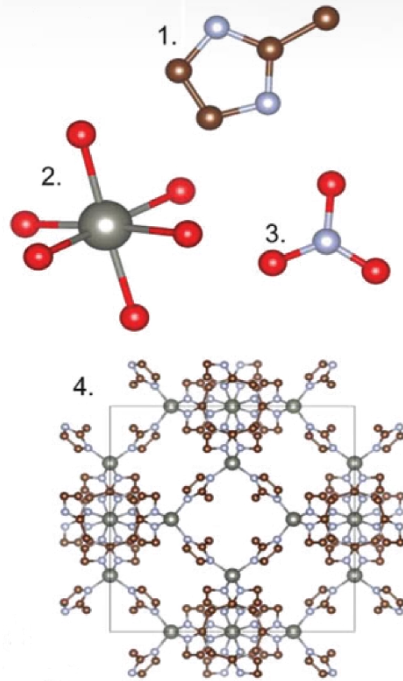


Tracking the Early Stage Growth of Metal Organic Frameworks



During the initial growth of MOFs, various building block units are formed: 2-Melm (1), oxygen-coordinated zinc (2), NO_3^- (3). They come together to form the ZIF-8 crystal (4). The elements are carbon (brown), nitrogen (blue), oxygen (red), and zinc (silver).

M. Terban, D. Banerjee, S. Ghose, B. Medasani, A.I Shukla, B. Legg, Y. Zhou, Z. Zhu, M. Sushko, J. Yoreo, J. Liu, P. Thallapally, S. Billinge. *Nanoscale* 10, 4291-4300 (2018).

Scientific Achievement

The initial stages of nucleation and growth of Metal Organic Frameworks (MOFs) were studied for the first time using in-situ X-ray Pair Distribution Function (PDF) analysis.

Significance and Impact

Given the wide-ranging applications of MOFs in gas storage, separations, and catalysis, understanding the formation of MOFs with atomic scale precision is key to optimizing the synthesis of future MOFs.

Research Details

- MOF ZIF-8 was synthesized and measured in-situ during the initial stages.
- In-situ PDF analysis revealed structural intermediates in the transition from nanocrystal clusters to large crystals.

Work was performed in part at Brookhaven National Laboratory