Controlling nanoparticle synthesis derived from bimetallic metal-organic frameworks

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Metal-organic frameworks (MOFs) have been recently known as novel precursors in nanomaterial synthesis. To understand the mechanism behind the phase transformation in atomic scale, we apply in-situ X-ray pair-distribution analysis to monitor the whole process, from distortion, destabilization, partial reduction, to the eventual nanoparticle formation and defect evolution of a series of bimetallic MOFs PCN-250. These MOFs with different trimeric node composition (Fe_3, Fe_2Co, and Fe_2Ni) allow us to control the structure, chemistry, and defect of resulting nanoparticles. Notably, we found selective reduction of Ni from the node with defect-rich frameworks retained. This can be a new route for future MOFs crystal engineering.

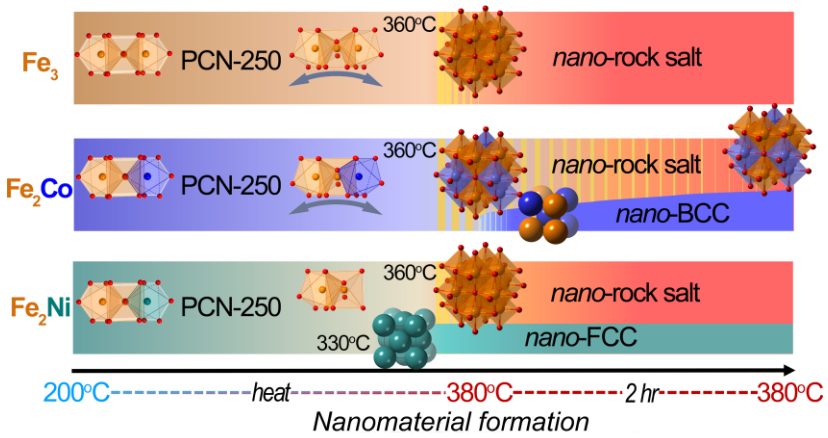

Figure 1. The structure of MOFs and resulting nanophases are tracked through PDF analysis.

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