# ABSTRACT -1

## Homogeneously Crystalline Metal-Organic Microstructures

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Coordination-based polymers and Metal Organic Frameworks (MOFs) have been explored since their serendipity discovery by a Berlin color-maker named Diesbach at the beginning of the 18th century. These intriguing materials combine metal-coordination chemistry with the often complex formation of large supramolecular structures. These polymers may exhibit optical, catalytic, redox, and magnetic functions derived from their metallic elements. Such materials are currently generated by the dozens in a gold-rush-type search for unique properties mainly related to the storage and release of energy (e.g., hydrocarbons, dihydrogen) at ambient temperatures and pressures. Rational design of their packing at the molecular level is challenging in spite of numerous reports. Moreover, how the molecular components, metal salts, and experimental conditions control the dimensions, shapes, and homogeneity of these coordination-based materials is barely known. The formation of homogenous microstructures is a key step for their use as applicable magnetic and/or electronic materials.

The rational design of the microstructure of metal-organic supramolecular architectures as gas storage materials, control of their properties and the basic rules that govern their formation have been part of this study. Using a versatile ligand system that binds late-transition metals in a defined manner, we address various challenging issues related to the mechanism underlying the formation of homogeneous structures at the (sub)-microscale. These new materials have been characterized by a series of complementary methods, including electron microscopy, X-ray powder diffraction, atomic force microscopy and synchrotron X-ray reflectivity. Preliminary investigations on the gas adsorption properties of these MOFs gave promising results.[1,2]

1. van der Boom, M. E.; Lahav, M.; Balgley, R.; Shankar, S. **2013**, US61/846,021.

2. Shankar, S.; Balgley, R.; Lahav, M.; Cohen, S. R.; Leitus, G.; Popovitz-Biro, R.; van der Boom, M. E. *Submitted*.