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Designing Self-assembled Nanostructures: Metal – Organic Molecule Coordination Networks at Surfaces STEVEN L. TAIT, A. LANGNER, N. LIN, S. STEPANOW, Max Planck Institute for Solid State Research (MPI), C. RAJADURAI, M. RUBEN, Forschungszentrum Karlsruhe, Germany, K. KERN, MPI, Stuttgart, Germany — Networks of isolated metal atoms and organic ligands can be designed to self-assemble at surfaces in desired patterns, producing regular 2D nanopore lattices, whose dimensions and properties can be controlled by selection of the organic ligand. We constructed such a network by coordination of molecules containing pyridyl groups with the inherent adatom population on a Cu(100) surface at room temperature. We produced the same network on Ag(100) and Ag(111) by depositing Cu atoms with molecules, showing the network rigidity on different substrates. Rectangular networks with higher complexity were formed from two species of organic ligands with metal atom nodes. The nanopore size and aspect ratio can be tuned by independently selecting the two ligand species. Some properties of these designed nanostructures can be 'tuned' by rational selection of the organic molecule and metal components. We have especially explored the adsorption of simple molecules on these networks, which may be of interest for future chemical or catalytic applications. The ability to tailor the size and functionality of nanometer-scale arrays produced by self assembly represents a unique opportunity for molecular recognition, heterogeneous catalysis, and other fields.

Steven L. Tait
Max Planck Institute for Solid State Research

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