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Fabrication of Complex Crystals Using Kinetic Control, Chemical Additives and Epitaxial Growth. John C. MacDonald[1], G. Tayhas R. Palmore[2], Tzy-Jiun Mark Luo[2], [1]Dept. of Chemistry & Biochemistry, Worcester Polytechnic Inst., Worcester, Massachusetts, USA, [2]Div. of Engineering, Brown Univ., Providence, Rhode Island, USA.

We have shown that crystals with multiple molecular components and having specific shapes and compositions can be fabricated as a first step toward the design of crystalline materials with complex three-dimensional surface features and topologies. We have studied factors that influence the morphology and kinetics of growth for a series of crystals composed of complexes of bis(imidazolium 2,6-dicarboxypyridine) M (II) where M = Cu (II), Ni (II), Zn (II), Co(II), and Mn. We describe methods to control the kinetics of growth and morphology of crystals composed of these complexes. We show that different facets of the substrate crystals selectively promote or inhibit epitaxial growth, and that compatibility between the substrate and epitaxial crystal can be controlled through mixing of components. These methods provide a convenient means to manipulate the morphology and surface topography of crystals, and to fabricate complex crystals that feature different metal complexes segregated in different regions via patterned deposition.