Crystalline Supramolecular Ladders *via* Co-Crystals

Tony N Sokolov, Tomislav Friščić, Leonard R. MacGillivray, *Department of Chemistry, University of Iowa.* E-mail: tony-sokolov@uiowa.edu

Controlling the organization of molecules in organic solids is a topic of fundamental importance for the design of supramolecular materials. In this context, methods to dictate the organization of functional molecules in one dimensional arrays are emerging as an important area. The formation of such arrays may be achieved in either two ways: covalent functionalization of a substrate or co-crystallization. While substrate functionalization allows for the packing to be directed solely by the substrate, meaning that the bulk crystal is based purely on the substrate, the method also inherently requires further covalent modification to tune a desired property. In contrast, co-crystallization allows for the use of a "divide and conquer" approach, enabling the substrate to remain untouched while changes to the co-crystallizing agent tune a desired property. In this poster, we demonstrate the ability of 3-aminophenol (3AP) to function as a co-crystallization agent to direct the formation of infinite 1-D ladder-like assemblies in the solid state. The approach utilizes an O-H bond coupled with one N-H bond of 3AP to direct the face-to-face arrangement of a series of bipyridine units, by way of hydrogen bonds, while the second N-H bond of the amine interacts with a neighboring assembly. This approach has been extended to a series of three unsaturated homologues having the 4-pyridyl functionality; namely, 4,4'-dipyridyl(dpy), *trans*-1,2-bis-(4-pyridyl)acetylene(bpa), and *trans*-1,2-bis-(4-pyridyl)ethylene(bpe). X-ray crystal structure analyses of the co-crystals involving (3AP)·(dpy), (3AP)·(bpa), and (3AP)·(bpe) confirms the 1-D ladder-like structures. Future work will involve studying the photophysical properties of such solids.

Keywords: supramolecular chemistry, co-crystals, infinite arrays