

There are two projects examine next summer

Project 1. Designed Crystalline Material

A fundamental technique used to acquire information on the three-dimensional structure of molecules involves x-ray crystallography, a technique in which a crystal of a material is exposed to x-rays and the diffraction pattern observed is interpreted and used to decipher the structure.

To be crystalline, a material must have features that let it interact well with other molecules like it. It must also have the structural rigidity such that the loss in entropy caused by molecules coming together in a crystalline matrix does not overshadow the positive enthalpic effects of new intermolecular interactions.

In this project, we will use organometallic reactions to synthesize new molecules that have incorporated features that have increased structural rigidity. We postulate that these will be crystalline. We will then characterize these using x-ray diffraction, and analyze the how the molecules interact in the crystalline form.

Project 2. Structural Characterization of Natural Products

Plant extracts have long been used as medicines. Their components have been widely employed as lead compounds for the development of important pharmaceuticals. In this project, we will attempt to use crystallography to structurally characterize a number of samples of rare natural compounds with potentially interesting biological activities. Shown below is the crystal structure of isotenulin, a natural compound shown to have antitumor properties that we characterized by x-ray diffraction last summer.

