The synthesis of a uniform, orthogonal metal-organic framework is the first of its . In order to synthesize th MOF, the conditions for growth must be determined to maximize yield and purity as well as maintain the proper crystal structure. This is achieved by setting up several reactions varying concentration, temperature, solvents, co-solvents, and the pressure that is produced when the assembly occurs. Time can also be a factor in these optimal conditions. The components for this MOF are Zinc Nitrate as the metal, 2-aminoterephthalic acid (BDC-NH_2, and meso-α,β-di(pyridyl) glycol DPG. Each reaction that was set up was observed and characterized based on purity, size, color, and crystallinity of the MOF. The optimal conditions were determined to be 3.2mM of $Zn(NO_3)_2$• $6H_{2}0$: 5.0 mM BDC-NH_2: 5.0 mM DPG in DMF. Due to low solubility of the DPG, it was determined best to preheat the DPG, zinc, and DMF prior to adding the BDC-NH_2. The assembly occurs at 60°C for 48 hours for the maximum amount of crystal growth. The next process to making an orthogonal MOF is the post-synthetic modification of the functional groups inside the MOF in order to ensure that each ligand reacts independently.

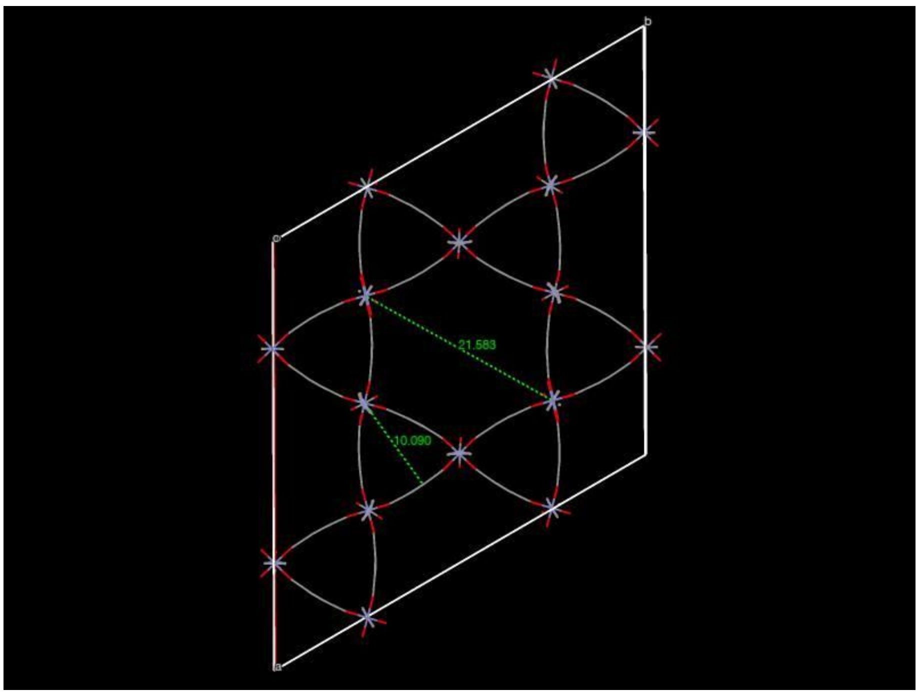

Figure 1: Crystal Structure of KSU-1

This project is important because this is the first MOF that contains uniform multivariate ligands. Other MOFs have had mixed ligands, but they were not uniformly distributed within the unit cell. This is important for many different applications including catalysis, drug-delivery, and many others. In the future, we will be looking at post-synthetically modifying the BDC-NH_2 to form an imine with a metal in order to be used for catalytic reactions. This MOF also contains a unique structure that has a large pore size, which allows for a wider selection of reactions to take place. Using solvent assisted ligand exchange, it may be possible to switch the ligands and in doing so increasing the potential reactions that can take place.