The goal of this project is to utilize coordinatively-unsaturated metal centers in metal—organic frameworks at surfaces to study the tuning of these metal sites for dihydrogen adsorption. The delicate challenge of binding the intact dihydrogen molecule requires stable adsorption at the metal site through donation of σ electrons from H₂ to unoccupied d orbitals of the metal, while avoiding excessive back donation to the H₂ anti-bonding orbital. We are studying a new type of binding site, a metal-organic complex at a solid surface. We have obtained molecular resolution images of self-assembled 2,5-pyrazine dicarboxylic acid (PDA) nanostructures on the Cu(100) surface, as well as results of the complexation of that molecule with Cr. Upon adsorption, PDA molecules adopt one of two adsorption chiralities and assemble into enantiopure chains.