Heidi Hu

*Helicobacter pylori* are pathogenic bacteria that can colonize the human stomach and has been linked to ulcers and gastric carcinomas. The ability of *H. pylori* to colonize the acidic environment of the human stomach is dependent on the activity of two nickel containing enzymes NiFe-hydrogenase and urease. The assembly of metal sites in these two nickel enzymes involves cascades of accessory proteins. The nickel chaperone, HypA, is one of these accessory proteins that are required for the full activity of both NiFe-hydrogenase and urease.

![Scheme 1](https://example.com/scheme.png)

**Scheme 1. Depiction of the Coordination Changes around the Zinc Atom Depending on pH and Ni Binding Status**

In addition to a nickel binding site, HypA also contains a structural zinc site. It was previously characterized in the Maroney lab that the HypA zinc site undergoes pH- and nickel-dependent ligand substitutions indicative of structural rearrangements of the protein. We are investigating the interactions of HypA with other accessory proteins, HypB and UreE, hypothesized to be involved in pH-selective maturation of NiFe-hydrogenase and urease.


Crisjoe Joseph

Part of the discussion will be on recent results where we show direct evidence of photo-driven H₂ production in synthetic seawater using quantum dots hydrogenase assemblies. FTIR light titrations experiments on these systems show direct evidence of active site reduction as well as sacrificial electron consumption. These results provide an exciting possible platform for hydrogen production with minimal environmental stress, as well as a catalytic process for economical water desalination.