

2pm, **October 22<sup>nd</sup>**, Room 1201

**Direct Probe of the Key Building Block of the  
Fe-Based Superconductors with Scanning  
Tunneling Microscopy/Spectroscopy**

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The recently discovered superconductivity in iron (Fe)-based compounds is another exciting advancement in condensed matter physics since the discovery of high-T<sub>c</sub> superconductivity in cuprates. Using a UHV Low Temperature Scanning Tunneling Microscope, we have been studying the structural and electronic properties of the parent and Co-doped BaFe<sub>2</sub>As<sub>2</sub> compound. We find that, by low temperature *in situ* cleaving, we are able to expose the key building block – the Fe-As layer of this compound, where superconductivity is believed to occur. With STM/S, we directly probe this key building block with spatial resolution down to atomic scale. STM is a surface sensitive technique. Keeping this in mind, I will demonstrate how we use this high real-space resolution and surface sensitive technique to learn the structural and electronic properties within the bulk. I will show some of our results on the structural and the density-of-states (DOS) evolution with doping, the scaling of the superconducting energy gap, and some electronic local effects. I will also discuss their implications of the interplay of magnetism and superconductivity, and of the pairing symmetry for superconductivity in the Fe-based superconductors.

**Host:** Min Ouyang