JMU Chemistry and Biochemistry Seminar
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Polymer-based models of metalloenzymes
and
Investigating chemistry students' illusions of competence

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1. Metalloenzymes are far more than just a metal center coordinated to a protein "ligand". While synthetic model systems have proven useful in probing metalloenzyme function, a challenge with these synthetic systems lies in replicating the second coordination sphere effects present in the biological milleau. For synthetic systems to provide microenvironments similar to those found in biological metal sites, they must incorporate molecular scaffolds that envelope a metal atom or complex and provide specific functionality at precise locations. We propose using polymers as such scaffolds—folded architectures can be achieved through incorporation of cross linking agents in the polymer backbone. By attaching collapsible polymer chains to metal complexes, we can prepare synthetic systems that can probe the effect of second coordination sphere interactions on the active sites of metalloenzymes such as [FeFe] hydrogenase and the cytochromes P450.

2. We have demonstrated that low performing general chemistry students suffer from illusory competence—they are substantially miscalibrated from their actual standing on course assessments. This miscalibration phenomenon also appears to persist across a semester, despite repeated feedback. However, actually *engaging* in feedback appears to abate students' illusions of competence. Briefly, students generated task feedback by addressing why a specific exam response did not receive full credit, provided responses that would have received full credit, and reflected upon learning/studying issues that resulted in receiving less than full credit. We confirm that this intervention helps students to become more calibrated to their performance on subsequent exams.