

Development of Fe²⁺/Fe³⁺ Electrochemical Sensors using Macromolecular Chelating Dendrons for Biological Applications

Axel O. Vera and Ana R. Guadalupe, Ph.D.

University of Puerto Rico, Río Piedras

Recently, disturbances in the homeostasis of iron in the brain have been associated with the development of neurodegenerative diseases such as Parkinson's, Huntington's, Friedrich Ataxia, Prion's, and Alzheimer's. Therefore, it is necessary to develop devices for extracting and detecting iron content in biological systems. Our goal is to develop Fe²⁺/Fe³⁺ electrochemical sensors for biological measurements because these can be nano-manufactured and introduced in biological systems for real-time analysis. Before constructing sensors, we will synthesize diverse ligand conjugates from traditional ligands. We will synthesize polymeric macroligands by incorporating dendron units to the synthesized conjugates. Dendron units provide chelating properties to the conjugates, increasing affinity for Fe²⁺ or Fe³⁺. The complexing properties of these chelating macroligands will be assessed in electrochemical and UV-VIS studies. Finally, electrochemical sensors will be constructed by modifying electrode surfaces with the polymeric chelating macroligands that show the highest selectivity towards Fe²⁺ or Fe³⁺.