

POLYMER HYDROGELS: A BIOCOMPATIBLE MATERIAL WITH MULTIPLE POTENTIAL USES IN SINGLE-USE SENSORS

Jules Magda, University of Utah, USA
magda@chemeng.utah.edu

Polymer hydrogels are crosslinked polymer networks that can absorb large quantities of water without dissolving. When contacting cells, they are relatively biocompatible compared to most other materials, because they are soft, and because they are mostly composed of water. Polymer hydrogels are already widely used as commercial contact-lens materials, and they are also essential elements of most continuous sensors that are currently being developed for single-use bioreactors. All continuous bioreactor sensors require a molecular recognition element that binds to the target analyte of interest (e.g. glucose). In many continuous sensors, the recognition element is an enzyme such as *glucose oxidase* that is immobilized within a polymer hydrogel matrix. In other continuous sensors, the molecular recognition element is itself a “smart” polymer hydrogel. A *smart polymer hydrogel* is a polymer hydrogel that reversibly and autonomously changes its degree of swelling in response to some external stimulus, such as change in temperature, pH, or concentration of a target analyte such as glucose. In this talk, I will review the basic physics and chemistry of polymer hydrogels, and then discuss how hydrogels can be designed for the above-mentioned sensor applications.