

FAIZ MANDANI

MASTER OF SCIENCE DEFENSE
CHEMICAL ENGINEERING

Influence of Synthesis Methodology on Microstructure and Performance of Poly(ethylene glycol) Hydrogels

Hydrogels are water-swallowable cross-linked networks of hydrophilic polymers. Their biomimetic characteristics have led to many biomedical applications including tissue engineering and drug delivery. Desired mechanical and diffusive properties can be tuned over a broad range by altering synthesis chemistry. It was the objective of this work to determine how alteration of these design parameters influences the hydrogel microstructure and consequently performance. The neo-Hookean, Mooney-Rivlin linearization, and Mooney-Rivlin global fit hyperelastic models were evaluated in their ability to predict hydrogel stress-strain behavior and regress hydrogel mechanical properties (shear modulus). Conventionally, the neo-Hookean model is utilized for modeling hydrogels; however, it was determined that the Mooney-Rivlin global fit better predicted PEG diacrylate (PEGDA) stress-strain behavior. It was also determined that time domain nuclear magnetic resonance relaxometry (TD-NMR) is capable of detecting hydrogel microstructural characteristics and average pore sizes. The mesh sizes obtained from the novel TD-NMR approach are in agreement with conventional techniques (mechanical characterization and small angle scattering).

Date:

**Monday,
August 10,
2020**

Time:

**Starts @
3:00PM**

**Zoom
Meeting
Details:**

[https://kansas.
zoom.us/j/999
25931240](https://kansas.zoom.us/j/99925931240)

**Meeting ID:
999 2593 1240**

**Password:
898254**

**Committee
Chair:**

**Professor
Stevin
Gehrke**