

**ID:**

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**Symposia/Special Sessions/Technical Tracks/Student Competition:**

A1 Biomedical Engineering & Human Health in Honour of Michael V. Sefton

**Oral or Poster presentation:**

Poster

**Presenting or Corresponding Author:**

Presenter

**Abstract Title:**

Nonlinear Viscoelastic Characterization of Gelatin Methacryloyl (GelMA) Hydrogels Under Large Amplitude Oscillatory Shear (LAOS)

**Abstract:**

Gelatin-based hydrogels have been widely used in three-dimensional cell culture, *in vitro* modeling, and tissue engineering. In most of the aforementioned applications, the mechanical response of the hydrogels is of great importance to reconstruct a desired tissue. To mimic the practical condition and evaluate the mechanical response of the Gelatin methacryloyl (GelMA) hydrogels imposed to large deformations, for the first time we studied the mechanical behavior of GelMA hydrogels employing large amplitude oscillatory shear (LAOS) flow. To achieve this, we prepared chemically cross-linked GelMA hydrogels featuring different cross-linking densities. Then we describe the rheological data by classifying the viscoelastic nonlinearity into two different categories: inter-cycle and intra-cycle. The stress decomposition method was applied to analyze shear stress waveform and to obtain nonlinear viscoelastic parameters. Using Lissajous–Bowditch plots and quantitative nonlinear parameters (e.g., nonlinear dynamic viscosities), we were able to detect the effect of cross-linking density on the nonlinear viscoelastic response of the hydrogels. Based on these results, it was shown that the hydrogels obey a nonlinear force-extension law in large deformations, which results in intra- and inter-cycle strain stiffening behavior.

**Invited Speaker:**

No

**Presentation Recording:**

No

**Would you like to be entered into the Graduate Student Poster Competition?:**

Yes

**I would like my presentation to be considered for publication in the special issue of the Canadian Journal of Chemical Engineering. :**

No

**Yes, I acknowledge that the co-authors that will be listed on this submission are aware and have agreed to be listed.:**

Yes, co-authors are aware and have agreed