University of Waterloo

Annual Symposium
on Polymer Science and Engineering

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Location:
E7

Formulation of Photocurable Resins for the Fabrication of Engineered Ferroelectrets

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Abstract:

Engineered ferroelectrets are polarized cellular polymer films with controlled internal micro-structures that show significant promise as high-performance piezoelectric materials. Vat photopolymerization (resin printing) is an attractive method to create engineered ferroelectrets; however, commercial resins do not have the required electrical properties. The presentation will discuss formulating resins for vat photopolymerization while balancing the competing requirements of high-resolution and suitable electrical properties. Focus will be placed on the practical aspects of controlling the resolution of a resin and the elements which impact formulation and performance. Several electrical characterization techniques will be highlighted showcasing the tools and challenges associated with understanding the electric properties of dielectric polymer films at high electric fields.

Bio:

Nicholas received both his undergraduate degree (Nanotechnology Engineering, BASc 2013) and graduate degree (Chemistry, PhD 2019) from the University of Waterloo. During his PhD, Nicholas worked under the supervision of Prof. Xiaosong Wang investigating the bulk supramolecular polymerization of metal coordination compounds. After completing his doctorate, Nicholas undertook a brief postdoctoral position with Prof. Em. Mario Gauthier, exploring adhesives based on functionalized polysiloxanes. Subsequently, Nicholas accepted a postdoctoral position sponsored by DAVWIRE at the University of Western Ontario with Prof. Aaron Price. Nicholas worked on the development of photocurable polysiloxane resins for the fabrication of polarized polymer foams called ferroelectrets. Nicholas joined DAVWIRE's team in 2023 to continue developing ferroelectrets for the aerospace and defense industries. Nicholas is currently an R&D manager at DAVWIRE and is also responsible for business development of technical services and products.

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