Materials Science & Engineering and Metallurgical Engineering Graduate Seminar

Wednesday, March 27 2019, 4:10-5:00PM, FASB 295

Logan Kiefer, BS/MS candidate MSE

Temperature effects on the electrochromic optical transitions of ethyl viologen diperchlorate-based electrochromic devices

Transparent electrochromic materials darken with an applied voltage, making them useful in a variety of applications. The optical transitions of one organic electrochromic molecule, ethyl viologen diperchlorate, likely vary with temperature, a phenomenon necessitating consideration when designing for applications with fluctuating temperatures such as variable tint ski goggle lenses or smart windows in buildings and automobiles during different seasons. This paper describes the synthesis of ethyl viologen diperchlorate electrochromic samples and discusses the performance of these samples with varying temperatures. Electrochromic transitions were modeled using the Avrami equation. The values for the temperature-dependent rate-constant, K, were compared at different temperatures using the Arrhenius and from the linearization of this model the activation energy was determined as 9.40 kJ/mol for coloring and 33.3 kJ/mol for bleaching. Electrochromic transition rates increase with increasing temperature.

Chris Hancock, BS/MS candidate MSE

High Resolution Strain Tracking of Elastomers Under Tensile Loading with the Aid of Video Capture and Computer Vision

Elastomers present a unique challenge stress/strain characterization. Their high degree of strain and subsequent deformation produces challenges in tracking strain so far as simple tensile loading techniques track displacement through displacement of the grips. There is specialty equipment for performing these measurements, however, this requires a high monetary investment which is not always available. This work explores a method for high resolution strain extraction of elastomers under tensile loading using video capture. A camera filmed the elastomer samples under loading and the subsequent film was processed using a video tracking through computer vision to identify the exact strain. This process proved to be effective in obtaining high resolution strain data with little capital costs and relative ease in execution.