



## Multiphysics Mechanics of Polymeric Materials

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Many new and exciting phenomena in mechanics are inherently multiphysics. A few examples include, thermally responsive shape-memory polymers, Joule heating causing creep, and pore pressure effects in geo-materials to name just a few. Because so many technologically important phenomena are inherently multiphysics, constitutive models and associated simulation tools must also include all relevant physics to capture the primary features of the materials response and be truly predictive. In this talk, I will discuss recent and ongoing research on the multiphysics response of polymeric materials.

Specifically, the talk begins with a summary of an experimentally validated constitutive theory for the thermo-mechanical behavior of amorphous polymers (e.g., polycarbonate). That is followed by a similar constitutive theory experimentally validated for thermally actuated shape-memory polymers that are chemically cross linked. The talk then moves onto thermo-chemo-mechanically coupled polymer gels, with an emphasis toward thermally active gels. The talk concludes with ongoing and future work.

Shawn Chester is currently an assistant professor in the Mechanical and Industrial Engineering Department at the New Jersey Institute of Technology. Shawn was previously a postdoctoral researcher at Lawrence Livermore National Laboratory and currently still holds a visiting appointment there. Prior to that he obtained his PhD in solid mechanics from the Mechanical Engineering Department at MIT, and obtained both his BS and MS in Mechanical Engineering from NJIT.

Shawn's research focus in the past few years has been the development of experimentally validated continuum level constitutive theories for large-deformation multi-physics behavior of polymeric materials and the associated numerical implementation. His work spans most aspects of mechanics; experimental characterization, theoretical modeling, numerical implementation, and experimental validation.



**September 5th, 2014**  
**11:00 AM Seminar**  
**Room 233 MUDD**