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Polymeric diffusion limited oxidation: Theoretical and experimental convergence

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Organic materials are generally susceptible to oxidation from ambient atmospheric exposure, and the extent of oxidation can be correlated to variance in the intrinsic material properties usually leading to brittleness. Oxygen gas permeation into a polymer is governed by diffusion with a reductive term derived from a free-radical mechanism of polymer oxidation. Experimental quantification of the constants governing oxygen transport and reaction allows for the numerical prediction of oxidative ingress and empirical derivations of the variance of these constants with oxidation extent allows for the prediction of heterogeneous degradation that agrees with phenomenological observations. This talk will show the numerical predictions of temporal oxidative ingress in multiple dimensions with the use of contemporary non-linear partial differential equation solving techniques.

Biography

Adam Quintana served as Technological Researcher at Sandia National Laboratories in Albuquerque, New Mexico, where he developed the theoretical and numerical techniques to spatially predict polymeric oxidation. Currently, he is pursuing his PhD at the University of New Mexico, where he is studying the phase separation and dynamics of biological polymers. His expertise lies in utilizing transport and thermodynamic relationships to quantify non-linear physical systems.

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