

Abstract Submitted
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A Study of the Concentration Dependent Water Diffusivity in Polymer using Magnetic Resonance Imaging HOWON LEE, Massachusetts Institute of Technology, JIAXI LU, JOHN GEORGIADIS, University of Illinois at Urbana-Champaign, NICHOLAS FANG, Massachusetts Institute of Technology — Hydrogel allows solvent molecules to migrate in and out of the polymer network, often in response to various environmental stimuli such as temperature and pH, resulting in significant volumetric change. Kinetics of penetrants in polymeric network determines time dependent behavior of hydrogel. However, swelling deformation resulting from the solvent uptake in turn significantly changes diffusivity of solvent, and this strong coupling makes it challenging to study dynamic behavior of hydrogels. Here we study concentration dependent diffusivity of water in poly(ethylene glycol) diacrylate (PEGDA) hydrogel using magnetic resonance imaging (MRI). Projection micro-stereolithography is used to fabricate gel samples in which a gradient of water volume fraction occurs. In situ measurement using MRI provides quantitative relationship between diffusivity and volume fraction of water in the gel. This result will help better understand interstitial diffusion behavior of solvent in polymers, which has great implication in board areas such as soft matter mechanics, drug delivery, and tissue engineering.

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