Analysis of Diffusion through Dynamic Network Polymers using Multi-photon Fluorescence Recovery after Photobleaching JIAHUI LI, Department of Chemical Engineering, University of Rochester, KELLEY SULLIVAN, EDWARD BROWN, Department of Biomedical Engineering, University of Rochester, MITCHELL ANTHAMATTEN, Department of Chemical Engineering, University of Rochester — Multi-Photon Fluorescence Recovery after Photobleaching (FRAP) techniques are utilized to study small molecule transport through polymer networks containing multiple hydrogen-bonding functional groups. Experiments involve uniformly dispersing small dye molecules (fluorophores) into functionalized polymers and networks. Polymer samples are then locally bleached, and the recovery of fluorescence is studied using 2-photon fluorescence microscopy. By curve-fitting fluorescence recovery curves to a model, diffusion coefficients are obtained. We have investigated series of polymer networks containing H-bonding interactions with different compositions at different temperatures. The diffusion coefficient through these polymer networks shows an expected Arrhenius-like temperature dependence. The influence of hydrogen bonding and network architecture on transport activation energies will be discussed.

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