Abstract

This talk will illustrate our recent efforts to advance hydrogel chemistries for 3D cell culture and dynamically control biochemical and biophysical properties through orthogonal, photochemical click reaction mechanisms. We have developed new self-assembled molecular-based materials including polymers and liquid crystals [1]. Use of dynamic properties and ordered structures of these materials leads to the formation of photo-, electro-, and ion-active materials as well as stimuli responsive and environmentally functional materials. Design of molecular shape, tuning of molecular interactions, and control of order of nano-segregated structures are key for the development of functional nanostructured materials. One of our approaches is the development of stimuli-responsive luminescent materials [1,2]. For example, we have obtained tricolored mechanochromic materials [2]. Another example is nanostructured transporters of ions, charges, and molecules [3-5]. Efficient and selective transportations have been achieved by using 3D, 2D, and 1D channel in the self-assembled structures [5-7]. For example new electrochromic materials have been prepared using 2D liquid crystals having charge and ion pathways [4]. Moreover, ion, proton, and mass transporting materials have been obtained by using bicontinuous cubic phases of liquid crystals having 3D interconnected channels. These nanostructures of solid polymer electrolytes have been preserved by in-situ polymerization of the reactive liquid crystals.

References


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