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Authors: Andrew E. Coukouma, Sanford A. Asher

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Increased Volume Responsiveness of Macroporous Hydrogels

Andrew E. Coukouma and Sanford A. Asher

Department of Chemistry, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA

asher@pitt.edu

Fax: +1 412 624 0588; Tel: +1 412 624 8570

Highlights

- Determined that the magnitude of the hydrogel VPT increases with increasing void volumes
- Hydrogel VPT increased by 3 to 10-fold due to the incorporation of voids
- The incorporation of voids decreases the elastic free energy induced osmotic pressure
- Macroporous hydrogels appear more mechanically robust than non-macroporous hydrogels

Abstract

Hydrogels can be fabricated into smart materials whose volumes predictably depend on their chemical environment. These smart hydrogel materials can be utilized in applications such as sensors, actuators, and for drug delivery materials, for example. The volume response of these hydrogels is well-known to be limited by their crosslink density. Thus, the responsiveness of hydrogels can be increased by decreasing the hydrogel's crosslink density. Unfortunately, this also decreases the hydrogel strength.

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