EuroSciCon

3rd Edition of International Conference and Exhibition on

Polymer Chemistry

March 26-28, 2018
Vienna, Austria

Jong Hwa Jung, Polym Sci, Volume 4
DOI: 10.4172/2471-9935-C1-008

HIGH MECHANICAL STRENGTH OF SUPRAMOLECULAR GELS FORMED VIA HYDRAZONE REACTION

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Supramolecular gels comprised of low-molecular-weight gelators are generally regarded as mechanically weak and unable to support formation of free-standing structures, hence, their practical use with applied loads has been limited. Here, we reveal a technique for *in situ* generation of high tensile strength supramolecular hydrogels derived from low-molecular-weight gelators. By controlling the concentration of hydrochloric acid during hydrazone formation between calix[4]arene-based gelator precursors, we tune the mechanical and ductile properties of the resulting gel. Organogels formed without hydrochloric acid exhibit impressive tensile strengths, higher than 40 MPa, which is the strongest among self-assembled gels. Hydrogels, prepared by solvent exchange of organogels in water, show 7,000-10,000-fold enhanced mechanical properties because of further hydrazone formation. This method of molding also allows the gels to retain shape after processing, and furthermore, we find organogels when prepared as gel electrolytes for lithium battery applications to have good ionic conductivity.

Biography

Jong Hwa Jung received his PhD Degrees in Chemistry from Gyeongsang National University and Kyushu University, Japan in 1993 and 2005, respectively. From 1994 to 2005, he worked as a Postdoctoral Fellow at Osaka University, as a Research Scientist at the Japan Science and Technology Corporation, and as a Principal Researcher at the Korea Basic Science Institute respectively. He has been a Professor in the Department of Chemistry at Gyeongsang National University since 2006. His research interest involves: supramolecular chemistry, organic-inorganic hybrid nanomaterials, functional silica-based nanomaterials, sol-gel chemistry, self-assembled gels, molecular recognition based nanosensors.

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