



TECHNOLOGY

Highly Stretchable Robust Superabsorbent Gels

OVERVIEW

Background

Polymer hydrogels are three dimensional networks of polymer chains that swell in aqueous solutions. These materials are used in applications ranging from consumer products to tissue engineering. Synthetic hydrogels can be engineered to exhibit swelling ratio, defined as the mass ration of swollen gel to dry network, on the order of 100-1000. Such super swelling or superabsorbent gels are used in disposable diapers and other products.

Superabsorbent gels are usually fragile and rupture when stretched to moderate strains. While many approaches have been developed to create tougher gels, these typically retard the water absorbency of the gel. Alternate methods are needed to devise hydrogels with large swelling ration but remain reasonably tough even in the swollen state.

Innovative Technology

Researchers at the Universty of Maryland have developed a new class of hydrogels that offer a superior combination of high swelling (super absorbency) and good mechanical properties (toughness and high extensibility). The gel is based on the monomer N,N-dimethylacrylamide, an acrylamide derivative that has been used extensively in hydrogel synthesis. The ionic comonomer sodium acrylate is included during polymerization. The resulting ionic gels swell significantly in water, with swelling ratios approaching 3000, which are among the highest reported to date. At the same time these gels are highly stretchable compared to conventional gels both in as prepared and the swollen states with elongation at break point of 1350% and 400% respectively.

APPLICATIONS

Superabsorbent diapers for infants and adults
Feminine hygiene products

ADVANTAGES

Super absorbency, among the highest reported
Superior mechanical properties
Highly stretchable

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Additional Information

INSTITUTION

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EXTERNAL RESOURCES

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