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Preparation and characterization of cellulose/N,N'-methylene bisacrylamide/graphene oxide hybrid hydrogels and aerogels

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Highlights

- A facile method was used to prepare cellulose-based hybrid hydrogels.
- The obtained hydrogels gave improved properties.
- MBA decreased aerogel's density but increased its' porosity.
- The addition of GO improved the recoverability of the aerogels.

Abstract

Cellulose/N,N'-methylene bisacrylamide/graphene oxide hydrogels were prepared by mixing cellulose with N,N'-methylene bisacrylamide (MBA) and graphene oxide (GO) in NaOH/urea aqueous solution. Two states of hydrogels, i.e. the freshly prepared hydrogels and the hydrogels at swelling equilibrium state in deionized water, were prepared. The gelation time, mechanical properties, transparency, texture properties and water retention ratio of the hydrogels were investigated. Results showed that the cellulose solution showed obvious MBA and GO induced gelation behaviors. Hydrogels with compressive strength (28.10~44.68 kPa for freshly prepared hydrogels and 40.91~58.69 kPa for swelling equilibrium state hydrogels), good transparency (25% for freshly prepared hydrogels and 35~65% for swelling equilibrium state hydrogels), high water retention ratio ($3.22\sim 3.16 \times 10^4\%$) can be obtained. In addition, aerogels with good recoverability and certain adsorption

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