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Abstract

A Novel 3D Microporous Structure Hydrogel with Stable Mechanical Properties and High Elasticity and Its Application in Sensing †

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Abstract: Hydrogels have recently been increasingly studied due to their similarity to natural soft tissues. However, the stable mechanical properties and elasticity required for hydrogels used in sensing and wearable devices remain challenging. Herein, a novel 3D microporous structure hydrogel with favorable stable mechanical properties and elasticity is developed via a simple and economical method. The good resilience (94.5%) and lower residual strain (11.5%) are realized based on the results of 20 successive cycles at a strain of 300%. The elasticity of the hydrogel is achieved by varying the effective network chain density. The prepared hydrogel has stable mechanical properties and a high elasticity, resulting in remarkable performance when used in sensors. The hydrogel-based sensors can accurately and consistently record human activities when used as wearable sensors. This work provides a new way to simply and effectively prepare hydrogels, which has great potential to be widely applicated in sensing and flexible devices, such as health-recording sensors, wearable devices, and artificial intelligence.

Keywords: 3D microporous structure; hydrogel; sensor; stable mechanical properties; elasticity

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