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Polymer Science

Gamma- Cyclodextrin- Recognizable Hydrogels



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Posted on December 5, 2016



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Stimuli-responsive smart hydrogels can dramatically change their volumes or other physical-chemical properties when triggered by

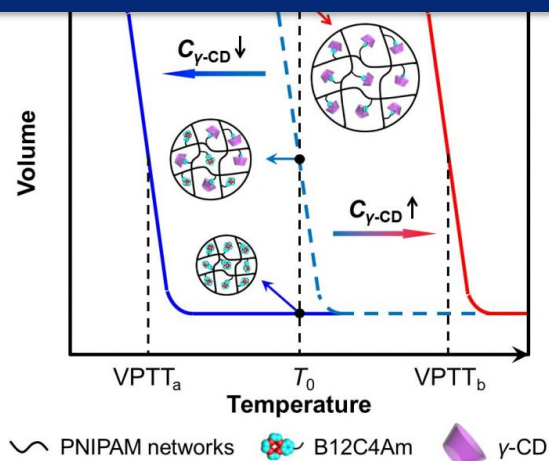
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temperature, light, certain molecules or ions. Such hydrogels show great promise in many applications including switches, adsorbents, sensors, and drug carriers.



Combining the ion-recognition ability of crown ether units and the thermo-induced volume change behavior of poly(*N*-isopropylacrylamide) (PNIPAM) polymers, different kinds of ion-responsive hydrogels have been developed. In addition to the ion-recognition abilities, crown ethers can also act as guest molecules to be captured by some macrocycle molecules.

Recently, the Liang-Yin Chu group at Sichuan University have developed a novel smart hydrogel with benzo-12-crown-4 (B12C4) groups as molecular-recognition units and PNIPAM networks as phase-transition actuating units. The as-prepared hydrogel exhibits selective γ -cyclodextrin (γ -CD)-recognizable properties.

With B12C4 groups selectively included by γ -CD, the volume phase transition temperature VPTT value of as-prepared hydrogel increases to a higher value due to the formation of inclusion

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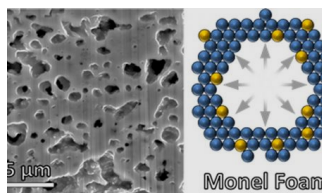
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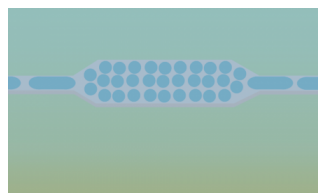
operation temperature. Furthermore, the prepared hydrogel also shows thermoresponsive adsorption property selectively towards γ -CD. The γ -CD-recognition sensitivity of prepared hydrogel can be dramatically improved by increasing γ -CD concentration in solution or B12C4 content in hydrogel networks.

The proposed unique hydrogel is highly promising for the development of molecular-recognition sensors and switches, molecular separation systems, and so on. The design strategy of these smart hydrogels will provide valuable guidance for widening the practical applications of smart hydrogels.

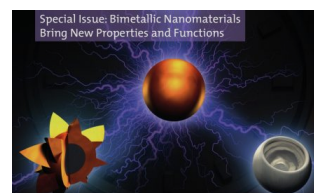
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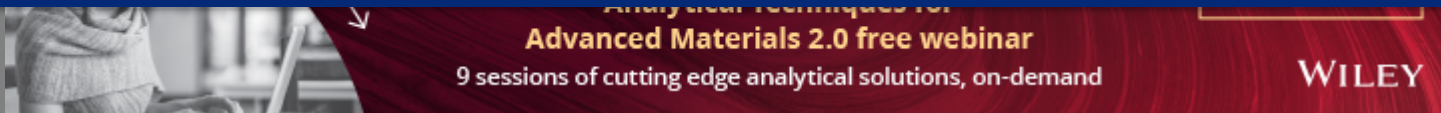


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