

## Accepted Manuscript

Strong and Tough Fully Physically Crosslinked Double Network Hydrogels with Tunable Mechanics and High Self-Healing Performance

Xiao-Hui Wang, Fei Song, Dan Qian, Yao-Dong He, Wu-Cheng Nie, Xiu-Li Wang, Yu-Zhong Wang

PII: S1385-8947(18)30896-9  
DOI: <https://doi.org/10.1016/j.cej.2018.05.081>  
Reference: CEJ 19097

To appear in: *Chemical Engineering Journal*

Received Date: 4 January 2018  
Revised Date: 8 May 2018  
Accepted Date: 12 May 2018

Please cite this article as: X-H. Wang, F. Song, D. Qian, Y-D. He, W-C. Nie, X-L. Wang, Y-Z. Wang, Strong and Tough Fully Physically Crosslinked Double Network Hydrogels with Tunable Mechanics and High Self-Healing Performance, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.05.081>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Strong and Tough Fully Physically Crosslinked Double Network Hydrogels with Tunable Mechanics and High Self-Healing Performance

Xiao-Hui Wang, Fei Song\*, Dan Qian, Yao-Dong He, Wu-Cheng Nie, Xiu-Li Wang,  
Yu-Zhong Wang\*

Center for Degradable and Flame-Retardant Polymeric Materials (ERCPM-MoE), College of Chemistry, State Key Laboratory of Polymer Materials Engineering, National Engineering Laboratory of Eco-Friendly Polymeric Materials (Sichuan), Sichuan University, 29 Wangjiang Road, Chengdu 610064, China.

\* Corresponding authors: songfei520@gmail.com; yzwang@scu.edu.cn

## Abstract

Suffering weak mechanical properties, hydrogels are generally limited for high load-bearing applications. Herein, chitosan and poly(acrylic acid) (PAA) are employed as double networks (DN), and metal-coordination and chain entanglement are exploited as dual crosslinks to develop fully physically crosslinked DN hydrogels. In spite of the non-covalent crosslinking, the hydrogel exhibits impressive tensile properties ( $3.7 \pm 0.12$  MPa) and toughness ( $1200 \pm 50\%$  of elongation at break and  $2.8 \times 10^3$  J m<sup>-2</sup> of fracture energy). In addition, good fatigue resistance and self-recovery performance are achieved for the hydrogel because of their supramolecular nature. Notably, the DN hydrogel display good self-healing property with recovered fracture stress and strain of 1.4 MPa and ~700%, respectively. The results indicate that the supramolecular design proposed in this work can bring more benefits for wide applications of hydrogel.

## Key words

Double network hydrogel; Physical crosslinking; Mechanical property; Self-healing

Download English Version:

<https://daneshyari.com/en/article/6578752>

Download Persian Version:

<https://daneshyari.com/article/6578752>

[Daneshyari.com](https://daneshyari.com)