Accepted Manuscript

Room-temperature self-healing tough nanocomposite hydrogel crosslinked by zirconium hydroxide nanoparticles

Haoyang Jiang, Gongzheng Zhang, Xianqi Feng, Huanqing Liu, Feibo Li, Muqun Wang, Huanjun Li

PII: S0266-3538(16)31516-0

DOI: 10.1016/j.compscitech.2016.12.027

Reference: CSTE 6617

To appear in: *Composites Science and Technology*

Received Date: 19 October 2016

Revised Date: 23 December 2016

Accepted Date: 29 December 2016

Please cite this article as: Jiang H, Zhang G, Feng X, Liu H, Li F, Wang M, Li H, Room-temperature self-healing tough nanocomposite hydrogel crosslinked by zirconium hydroxide nanoparticles, *Composites Science and Technology* (2017), doi: 10.1016/j.compscitech.2016.12.027.

Room-temperature self-healing tough nanocomposite hydrogel crosslinked by zirconium hydroxide nanoparticles

Haoyang Jiang, Gongzheng Zhang, Xianqi Feng, Huanqing Liu, Feibo Li, Muqun Wang, and Huanjun Li*

School of Chemical Engineering and Environment, Beijing Institute of Technology, Beijing, P. R. China, 100081.

*Corresponding author.

E-mail address: lihj@bit.edu.cn (H.J. Li)

ABSTRACT: Tough hydrogels with excellent self-healing properties at room temperature are of great importance for their potential applications in biomedical fields. Here, we demonstrate a design of novel zirconium hydroxide crosslinking nanocomposite hydrogel that combine high toughness (compressive strength of 36.6 MPa and tensile strength of 404.3 KPa) and self-healing efficiency (86%) at ambient condition. The Zr-NC gel was synthesized by the random copolymerization of 2-acrylamido-2-methyl propane sulfonic acid (AMPS) and acrylamide (AM) through a facile preparation. The designed hydrogen-bonding network can be tuned through changing the molar ratio and zirconium hydroxide. This novel Zr-NC gel will open an avenue for the healable artificial cartilage and tissue engineering.

KEYWORDS: Self-healing; Nanocomposite hydrogel; Zirconium hydroxide nanoparticles; High strength