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ORIGINAL ARTICLE

Carboxymethylagarose-based multifunctional hydrogel with super stretchable, self-healable having film and fiber forming properties

Jai Prakash Chaudhary [a,b], **Faisal Kholiya** [a], **Nilesh Vadodariya** [a,b], **Vimal M. Budheliya** [a], **Azaz Gogda** [a], **Ramavatar Meena** [a,b,*]

[a] *Natural Products and Green Chemistry Division, CSIR-Central Salt and Marine Chemicals Research Institute, G. B. Marg, Bhavnagar 364002, Gujarat, India*
[b] *AcSIR-Central Salt and Marine Chemicals Research Institute, G. B. Marg, Bhavnagar 364002, Gujarat, India*

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Abstract In this work, we repot a super stretchable and quick self-healable composite hydrogels with film and fiber forming properties through introducing hydrogen and covalent bonding. Herein, carboxymethylagarose (CMA) and polyvinyl alcohol (PVA) acts as physical crosslinkers. Boric acid (BA) prompt the formation of crosslinking through hydrogen bonding with blend polymers followed by strong ionic bonding between hydroxyl (—OH) groups of PVA and borate ions of BA. Hydrogel obtained under optimum conditions shows excellent stretching (> 100 times), quick self-healing (< 1 s), notches insensitive stretching, fiber and film forming ability. Such integrated properties for a hydrogel system have been achieved using seaweed derived polymer for the first time. In summary, this study opens up a new possibility to design and assemble multifunctional hydrogels using abundant seaweed derived polysaccharides with outstanding stretching, healing plus other properties by simple crosslinking chemistry.

1. Introduction

Hydrogels are three-dimensional polymeric networks, which formed between hydrophilic molecules by covalent or non-covalent interactions (He et al., 2011). Natural polysaccharides such as agar/agarose, carrageenan's, alginates, chitosan, starch, gelatin etc., and their derived materials have attained great height in biomedical field & tissue engineering etc., due to their biodegradable, biocompatible & environmental friendly nature (Spoljaric et al., 2014). Self-healing materials have been extended to hydrogels, as it possesses the ability

* Corresponding author at: Natural Products and Green Chemistry Division, CSIR-Central Salt and Marine Chemicals Research Institute, G. B. Marg, Bhavnagar 364002, Gujarat, India.
E-mail addresses: rmeena@csmcri.res.in, ramavatarm6@gmail.com (R. Meena).
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