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Development of a novel chitosan based biocompatible and self-healing hydrogel for controlled release of hydrophilic drug

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ABSTRACT

Smart polymeric hydrogels of chitosan and acryloyl-phenylalanine having potential of fast intrinsic shape memory properties (self-healing), non-toxic, biocompatible with moderate mechanical strength have been developed. The hydrogel has been formed by linking its network with flexible pendant side chains of chitosan and acryloyl-phenylalanine (exhibiting optimal balance of hydrophilic and hydrophobic moieties). The non-toxic and biocompatible behavior of the synthesized chitosan based hydrogel reveals its potential use towards the biomedical field. The side chain of hydrogel consists of amine and carboxylic acid groups and these moieties allow non-covalent interactions (H-bonding) across its interface. Thus, synthesized hydrogel shows very good self-healing property. Further, it has shown remarkable swelling (at different pH *viz.- 2*, 7, 9), cell viability (HEK-293 cells up to 200 µg/mL), cell proliferation, and controlled drug release and thus found multi-responsive.

Keywords: Chitosan; self-healing; cell-viability; proliferation; drug-delivery.

Introduction

Chitosan (CS) is a biopolymer having possibilities for chemical and mechanical modifications to generate novel properties, functions and applications especially in biomedical area **[1].** It possesses a linear straight-chain, composed of randomly distributed β-

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