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A facile synthesis method of hydroxyethyl cellulose-silver nanoparticle scaffolds for skin tissue engineering applications

Farah Hanani Zulkifli [a,*], Fathima Shahitha Jahir Hussain [a], Senait Sileshi Zeyohannes [a], Mohammad Syaiful Bahari Abdull Rasad [b], Mashitah M. Yusuff [a]

[a] Faculty of Industrial Sciences & Technology, University Malaysia Pahang, Lebuhraya Tun Razak, Gambang, 26300 Kuantan, Pahang, Malaysia
[b] Kulliyyah of Allied Health Sciences, International Islamic University Malaysia, Bandar Indera Mahkota Campus, Jalan Sultan Ahmad Shah, 25200 Kuantan, Pahang, Malaysia

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ABSTRACT

Green porous and ecofriendly scaffolds have been considered as one of the potent candidates for tissue engineering substitutes. The objective of this study is to investigate the biocompatibility of hydroxyethyl cellulose (HEC)/silver nanoparticles (AgNPs), prepared by the green synthesis method as a potential host material for skin tissue applications. The substrates which contained varied concentrations of $AgNO_3$ (0.4%–1.6%) were formed in the presence of HEC, were dissolved in a single step in water. The presence of AgNPs was confirmed visually by the change of color from colorless to dark brown, and was fabricated *via* freeze-drying technique. The outcomes exhibited significant porosity of >80%, moderate degradation rate, and tremendous value of water absorption up to 1163% in all samples. These scaffolds of HEC/AgNPs were further characterized by SEM, UV–Vis, ATR-FTIR, TGA, and DSC. All scaffolds possessed open interconnected pore size in the range of 50–150 μm. The characteristic peaks of Ag in the UV–Vis spectra (417–421 nm) revealed the formation of AgNPs in the blend composite. ATR-FTIR curve showed new existing peak, which implies the oxidation of HEC in the cellulose derivatives. The DSC thermogram showed augmentation in T_g with increased $AgNO_3$ concentration. Preliminary studies of cytotoxicity were carried out *in vitro* by implementation of the hFB cells on the scaffolds. The results substantiated low toxicity of HEC/AgNPs scaffolds, thus exhibiting an ideal characteristic in skin tissue engineering applications.

* Corresponding author.
E-mail address: farahhanani@ump.edu.my (F.H. Zulkifli).

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