ABSTRACT

The need for Biomaterials in the medical field for various purposes continues to increase. Most of biomaterial products available in Indonesia are imported products. They are expensive and take a long time to provide. Due to these reasons, research in the field of biocomposites is increasing. Sericin is a protein that is biocompatible, biodegradable and has other important properties. Sericin is widely used in biomedical applications and is a promising natural material as an alternative medical material.

The aim of the study was to analyze the pore diameter formed and the optimal mixture of sericin-bioplastics biocomposite using the Taguchi method. SEM and FTIR were also employed to see the pore diameter and biocomposite structure. The materials used were 16g, 14g and 10g of tapioca starch, 80 ml of aquades and 6 ml of glycerin, as well as 0.03, 0.1 and 0.3% sericin. Biocomposite underwent a freeze drying and freezing process at -25°C, -45°C and -80°C.

The results showed that the maximum mean and SNR responses were at 16g tapioca starch, 0.03% sericin and freezing temperature of -25°C. SEM showed that freezing at -25°C for biocomposite C: 41.94 μm, biocomposite F: 33.416 μm, and biocomposite I: 2.743 μm fulfilled the requirements for skin tissue regeneration. Predicted mean values and confidence intervals for large and small pore sizes were 11.656 μm and 54.602 μm, SNR values for large and small pore sizes were 31.940 μm and 33.642 μm. The mean experimental confirmation values of optimal conditions for pores with large diameters were greater than 32.342 μm and smaller than 34.206 μm, SNRs were greater than 32.342 μm and smaller than 34.206 μm. The freezing of biocomposite I at -80 C yielded C=O functional group which was not present in other samples.

Keywords: Optimal composition, materials medical alternative, sericin-bioplastics composite, Taguchi method, SEM, freze drying.

INTISARI

Kebutuhan Biomaterial bidang medis dalam berbagai keperluan terus meningkat. Produk biomaterial di Indonesia kebanyakan adalah produk impor, harganya mahal dan membutuhkan waktu lama saat dibutuhkan. Berdasarkan hal ini, penelitian di bidang biokomposit makin meningkat. Sericin adalah protein yang biokompatibel, biodegradable dan sifat penting lainnya. Sericin banyak digunakan dalam aplikasi biomedis dan merupakan bahan alami yang menjanjikan sebagai bahan medis alternatif.

Tujuan penelitian adalah menganalisis diameter pori yang terbentuk dan campuran optimal biokomposit sericin-bioplastik dengan menggunakan metode Taguchi. SEM dan FTIR untuk melihat diameter pori dan struktur biokomposit. Bahan yang digunakan pati tapioka 16g, 14g dan 10g, aquades 80 ml dan gliserin 6 ml, sericin 0,03, 0,1, dan 0,3%. Biokomposit mengalami proses freeze drying dan pembekuan pada -25°C, -45°C dan -80°C.

Hasil penelitian untuk respon rata-rata dan SNR, maksimum pada 16g tepung tapioka, 0,03% sericin dan pembekuan -25°C. SEM menunjukkan pembekuan -25°C biokomposit C: 41,94 μm, F: 33,416 μm, dan I: 2,743 μm memenuhi syarat regenerasi jaringan kulit. Nilai prediksi dan interval kepercayaan rata-rata besar 11,656 μm dan kecil 54,602 μm, SNR besar 31,940 μm dan kecil 33,642 μm. Nilai konfirmasi secara eksperimental kondisi optimal diameter pori besar untuk rata-rata lebih besar dari 32.342 μm dan lebih kecil dari 34.206 μm, SNR lebih besar dari 32.342 μm dan kecil 34.206 μm. pembekuan I biokomposit -80 C muncul gugus fungsi C = O yang tidak ada dalam sampel lain.

Kata kunci: Komposisi optimasi, bahan alternatif medis, biokomposit *sericin*-bioplastik, metode Taguchi, SEM, *freze drying*.