

Preparation of Poly(vinyl alcohol)-Based Polymer-Hydroxyapatite Composites and its Application to Scaffold Materials

H. Tsutsumi*^{a)}, Y. Shibasaki ^{a)}, K. Onimura ^{b)} and T. Oishi ^{b)}

*a) Applied Medical Engineering Science,
Graduate School of Medicine,*

Yamaguchi University, 2-16-1 Tokiwadai, Ube 755-8611, Japan

*b) Department of Applied Chemistry and Chemical Engineering, Faculty of Engineering,
Yamaguchi University, 2-16-1 Tokiwadai, Ube 755-8611, Japan*

Tel: +81-836-85-9282; fax: +81-836-85-9201; E-mail: tsutsumi@yamaguchi-u.ac.jp

ABSTRACT

Polymer-hydroxyapatite (HAp) composite is one of the promising candidates for tissue engineering scaffold materials, particularly bone and teeth. In this paper we demonstrated two preparation routes of poly(vinyl alcohol)-based polymer-HAp composites. First, the shape of a base polymer film was controlled by photo-patterning technique with a photo-crosslinkable polymer and hybridization of the shaped polymer film and HAp was performed by alternative soaking process. Poly(vinyl alcohol) bearing *trans*-cinnamate moiety as chromophoric groups, P(VA-VCI), was spin-coated on various substrates, glass, metals such as titanium, aluminum, stainless steel, and used for photo-patterned film formation by UV-light irradiation. The patterned P(VA-VCI) film on the substrate was processed alternate soaking process for preparation of P(VA-VCI)- HAp composites. We confirmed that formation of HAp in the P(VA-VCI) matrix by infrared spectroscopy and X-ray diffraction technique. Microscopic observation of the photo-patterned P(VA-VCI)-HAp composites was performed. We also prepared poly(vinyl alcohol) bearing phosphate moiety (PPVA). Hybridization of the shaped polymer film or fiber and HAp was performed by alternative soaking process. The deposition quantity and form of HAp on the polymer film and thermal mechanical properties were depended on the phosphate moiety and crosslinking sites in the polymer matrix.

Keywords: Poly(vinyl alcohol), hydroxyapatite, scaffold, photo-patterning and alternative soaking