

Effect of polyethylene pretreatments on the biomimetic deposition and adhesion of calcium phosphate films

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Received 19 April 2006; received in revised form 8 August 2006; accepted 16 August 2006

Abstract

The effect of ultraviolet irradiation and glow discharge (GD) processing of the polyethylene (PE) substrates on deposition of calcium phosphate (CaP) films from supersaturated aqueous calcium phosphate solutions was investigated in this study. CaP coatings deposited on the PE substrates were comprised of elongated clusters of spherical particles and 100% of the free surface area of nearly all of the substrates was covered with a porous CaP film after a 3 day immersion. Nano-scratch tests determined that PE–CaP adhesion was most improved when PE substrates were subjected to 50 WGD treatments. As determined by contact angle measurements, the GD-treated PE samples had the highest electron donor parameter of surface energy, suggesting that enhancing the electron donor parameter of PE leads to improved adhesion with the biomimetic CaP coating.