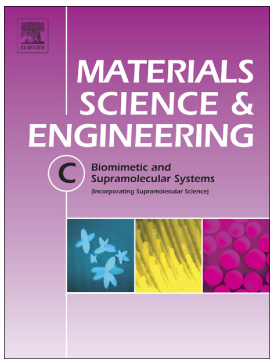

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Effects of Polycaprolactone on Alendronate Drug Release from Mg-Doped Hydroxyapatite Coating on Titanium

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Abstract

The scientific objective of this study was to understand the influence of PCL coating on alendronate drug release kinetics *in vitro*. Our hypothesis was PCL coating would minimize burst release of alendronate from plasma sprayed Mg-doped hydroxyapatite (HA) coated commercially pure titanium (CpTi) samples. In the US alone, over 44 million women and men aged 50 and older are affected by osteoporosis which can lead to replacement and /or revision surgeries. Alendronate is a widely-used drug for treating osteoporosis and would be an ideal drug to be loaded and released from these replacement systems. Initial burst release is a common phenomenon for the most drug loaded devices. To modulate the release kinetics, a biodegradable polymer, polycaprolactone (PCL), coating with slow degradable kinetics was employed. Samples with 2 and 4 wt.% PCL showed about 34% and 26% release of alendronate within the first 24 h, respectively, compared to 75% burst release without any PCL coating. With the addition of a PCL coating, a controlled release kinetics of alendronate was achieved from HA coated titanium implants, which can potentially impact millions of patients worldwide having compromised bone due to osteoporosis.

Keywords: Commercially pure titanium, hydroxyapatite coating, plasma spray, alendronate, drug delivery, polycaprolactone