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Effect of ablation laser pulse repetition rate on the surface protrusion density of hydroxyapatite thin films deposited using pulsed laser deposition

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Abstract

The effect of the pulse repetition rate of the ablation laser on surface protrusion density was investigated for hydroxyapatite thin films deposited using pulsed laser deposition. Atomic force microscope surface images showed a marked decrease in surface protrusion density at lower pulse repetition rate, while protrusion-free areas exhibited similar morphologies independent of the pulse repetition rate. These results indicate that the surface protrusions were not formed or enlarged from surface migration of atomic species on the surface, which formed the smooth surface of the protrusion-free area. The postulated origin of the protrusions was large particles or droplets produced directly from the target irradiated with the ablation laser. These results suggest that the optimum pulse repetition rate for protrusion-free hydroxyapatite thin film surfaces is ≤ 3 Hz.

Keywords

Hydroxyapatite; Pulsed laser deposition; Pulse repetition rate; Surface protrusion

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