

Picosecond laser fabrication of nitinol for coronary stent applications

Abstract

Nitinol (a shape memory nickel-titanium alloy) is one of the desirable materials for medical stents applications, due to its high corrosion resistance, self-expansion and biocompatibility. The stents are commonly fabricated by using Nd:YAG laser cutting. As a result of long pulses (10⁻³-10⁻² seconds) of these lasers, considerable post processing is required to remove heat affected zones and to improve surface finishes and geometry. This paper presents the feasibility and basic process characteristics of picosecond laser micromachining of nitinol tubes for coronary stent applications. In this study, dross-free cut of nitinol stents is demonstrated, also kerf width and topography analysis of the cut surface is presented. The picosecond laser ablation mechanism is also discussed.

Keywords; Coronary stents; Long pulse; Nitinol tubes; Picosecond laser; Picosecond laser ablation; Shape memory