

Femtosecond Laser Nano Texturing of Drug-Eluting Stents

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Stents have been used for over a decade to treat coronary arteries affected by stenosis, a state in which the arteries are narrowed by the deposition of plaque. However, studies have shown that a few years after placement of a stent, restenosis can occur at the site, hindering its purpose. Drug-eluting stents (DES) have a significant impact in treating in-stent restenosis. DES are embedded with drugs like Sirolimus that are released over time once the stent is placed within the artery, reducing the chance of plaque deposition around the stent. But DES increases the risk of thrombosis, formation of blood clots around the stent due to a change in the blood flow profile. To improve the DES characteristics, femtosecond pulsed lasers are used to create nano-textures on the metallic stents. Nano-textures increase the availability of the drug, increase adhesion of the drug and the stent, and minimize requirement of a polymer carrier. If the nano-textured materials can show effective fluid retention characteristics, this can be a cost-effective solution to reduce or completely eliminate in-stent restenosis and thrombosis without the need of post-finishing operations. The interaction of bio-elements with the metallic stents can also be tested to ensure the efficiency of the DES.