Microbiology: Current Research 2017

PICOSECOND LASER SURFACE TEXTURING OF STAINLESS STEEL AND TI-6AL-4V AS A METHOD TO REDUCE THE ADHESION OF BACTERIA

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Biofilm formation and colonization is initiated by bacterial attachment followed by bacterial adhesion and retention on a surface. The buildup of biofilms may result in related health problems in the medical field and potential biofouling issues in industrial settings leading to increased economic burden. The design and manufacture surfaces that prevent bacterial attachment, retention and biofilm formation through their physical structure and chemical properties provides a potential solution to tackle such issues. Laser surface texturing provides a crucial role for the production of different antifouling surface patterns for use in a diverse range of applications in different medical or industrial fields. In the present work, a 1064 nm Nd:YVO4 Picosecond laser was used to produce a range of textures on 316L stainless steel (SS) and Ti substrates. Surface parameters were determined; topography and roughness using a ZeGage Optical Profiler and wettability using a contact angle analyzer FTA 188. *Escherichia coli (E. coli)* attachment, adhesion and retention assays on the laser textured SS and Ti surfaces were investigated using three different assays (spray with wash, spray and retention). Scanning electron microscopy was used to determine the number of attached/adhered/retained bacteria. Results showed that the *Ra* values and wettabilities of the surfaces all increased when compared to the control following laser treatment. This work demonstrated that on all the surfaces, for all the assays, the number of adhesive bacteria on the laser textured surfaces was reduced compared to the untreated substrate.

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