

Persistence-based descriptors for surface roughness and its relation to bio-interface characteristics

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One of the major complications in trauma and orthopaedic surgery is the implant-associated infection. Biofilm forming bacteria use the hydrophilic metal surfaces as adhesion area which provides them with a pathogenic advantage. Infections are caused by contamination of the metal surfaces being implanted and a subsequent colonisation of the bacteria which spread on the surface after building adhesion to it. In combination to several procedures and measures to prevent and reduce complications through implant-associated infections, surfaces specifically designed by roughness manipulation to minimise bacterial adhesion are an important research topic. Shot peening, in particular, is one of the more promising surface modification procedures. To help understand the connection of bacteria on-growth and the surface characterization better we need to have good descriptors of its surface morphology. Surface roughness descriptors as defined by the ISO may struggle however to properly describe surface roughness patterns. Descriptors based on the persistence diagrams of the surfaces on the other hand provide several advantages opposed to the standard roughness parameters.