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Plasma treatments for surface cleaning of orthopaedic implants[1]
NISHANT SIRSE, CEZAR GAMAN, STEPHEN DANIELS, MILES TURNER, Dublin City University, Ireland — The cleaning process of manufacturing induced contamination from orthopaedic impants is an essential step to achieve surface biocompatibility and comply cleanliness requirement of implants for surgery. The current cleaning process involve removal of such residues by exposure to chemical detergents. An alternate approach to this process is to exploit low temperature plasmas. In this study, we investigated the removal of organic and inorganic process consumables using radio frequency atmospheric pressure multi-jet system. The plasma is operated in He/O_2 gas mixture, with and without admixture of water vapour. The discharge chemistry is diagnosed and optimized using optical emission spectroscopy and laser induced fluorescence. The cleaning technique is applied on the polished medical grade and aluminum oxide grit blasted titanium metal samples, which is analogue to one used in traditional metal implants. The surface cleaning is further examined and validated by the X-ray Photoelectron Spectroscopy (XPS), Scanning Electron Microscopy (SEM) and Fourier-Transform Infrared (FTIR) spectroscopy analysis. The results validate plasma cleaning as a viable alternative to wet-detergent cleaning.

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