

Eco-friendly Electropolishing of Medical Parts

Background

The surface roughness of a part or product strongly influences its properties and functions including medical, optical and visual performance. Electropolishing, which utilizes the anodic dissolution process to remove material from the metal/alloy in a concentrated electrolyte, is a non-contact, thermal less, and damage-free process. Since the material is removed by atoms through chemical reactions, a significantly smooth surface can be achieved.

Industrial demands

The post-treatment of used electrolyte is a challenge for industry considering the environmental requirements, because a large amount of electrolyte is needed for the industrial application, and some toxic metal ions, such as chromium (VI) ion, are included due to the anodic dissolution of metal. On the other hand, the electropolishing of 3D microstructures, , such as optical lens, is also urgently needed by industry due to the wide applications.

New method

Eco-friendly electrolytes is developed for the electropolishing technique to achieve comparable surface quality obtained from the conventional electrolyte. Due to the less or no toxicity, the electropolishing and post-treatment are improved in required environments. Moreover, the ultra-pulse current electropolishing is a promising method particularly for the electropolishing of microstructures.

Progress and results

The eco-friendly electrolytes are developed to electropolish 316LVM coronary stent and additive manufactured parts successfully to obtain significantly smooth surface with improved biocomparitibality and corrosion resistance due to the thick passive oxide layer generated on workpiece surface by electropolishing process. The electrolytes are verified with different materials.

