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Duplex stainless steel in biomedical applications

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Abstract

Duplex Stainless Steel (DSS) is defined as SS with a pitting resistance equivalent (PRE) value above 40. The DSS has localized corrosion resistance that is as good as the titanium alloys, because its passive film is enhanced by the synergistic effect of high concentrations of nitrogen and molybdenum. It also has high mechanical properties due to a solution strengthening effect. Because of its high mechanical and corrosion resistance, austenitic stainless steel has been replaced with austenitic-ferritic stainless steel in several industrial applications that require better resistance to stress-corrosion cracking. Results in the literatures also shows that the biocompatibility of austenitic and austenitic-ferritic steel is similar. In the case of orthodontic treatments, the replacement of austenitic stainless steel with austenitic- ferritic steel reduces costs and nickel hypersensitivity to patients, in particular, very high fatigue resistance can be reached. In the literature survey, the good behaviour in vitro of the (SAF 2507) DSS has been confirmed both by in vivo investigation on animals, and by the clinical experiences that have been performed.

Biography

Ali Sabea Hammood is a PhD. Metallurgical Engineering-Corrosion Engineering and Surface Protection from the University of Technology in 2004. He has authored for five scientific books in English by international and national publishers, and 41 scientific papers published in international and national, peer-reviewed for highly accredited scientific journals. He has supervised 5 PhD Projects and 9 M.Sc. Dissertations. as well as having a patent about using duplex stainless steel (2507) as a new material in orthodontic wires.

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