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Metal Surface Modification with Fatty Acids Using Ionising Radiation

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Background of the study.
Various metals and alloys are commonly used in medicine. As such they are often exposed to aggressive environments and thus subjected to corrosion, i.e. dissolution. Thus, modification of the metal surface is interesting since this way the resistance to corrosion can be increased and the durability of the object can be prolonged.
Medical equipment, in most cases, must be sterilized and a common method is using ionizing radiation. While ionizing radiation does not markedly influence the properties of the metal it can influence the protective layer that is formed on its surface.
Fatty acids are non-toxic compounds which have an affinity for self-assembling on metals and therefore lately they have been investigated as possible protective layers on metals. The influence of ionizing radiation on the formation of such a layer is needed to determine weather it changes the properties of the protective layer or maybe even enhances them.
Methodology. Procedures for adsorption of self-assembling layers of fatty acids on metals exist in literature. This work studies influence of ionizing gamma-radiation on the process of assembling such a layer and the efficiency of the outcoming layers in corrosion protection.
Various variables are studied. The most important variables are the applied dose of gamma irradiation, as well as the dose rate at which it is applied. The quality and efficiency of the obtained layers in corrosion protection are studied by electrochemical methods.
Results. The results have shown that the layer of fatty acid that forms on the surface of the metal using ionizing radiation offers additional protection to the bare metal making it more resistive to corrosion.
Conclusion. For successful formation of a protective layer on the metal it is essential to determine the proper molecule which has good adhesive properties and to irradiate with an appropriate dose, at an optimal dose rate.

Country/Organization invited to participate

Croatia

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