Special issue: Surface engineering of light alloys

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Editorial

Special Issue: Surface Engineering of Light Alloys

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Light alloys (mainly aluminum, magnesium and titanium alloys) are of great interest in applications where lightweight has an high impact, such as automotive, aerospace and biomedical fields.

In addition to their bulk properties, such as mechanical properties, thermal properties or density, surface properties are crucial in many applications. In fact the surface is the first layer of the material exposed to the working environment. In biological systems this means that the surface is the first approach of the material to biological entities and it plays a crucial role in situations like tissue integration or bacterial contamination. Moreover the surface is a critical area for corrosion or wear phenomena both in biomedical and automotive or aerospace applications. Finally the surface can be the starting point for joining processes, in this scenario proper surface preparation can significantly affect the joint performance.

In this context surface engineering of light alloys is a versatile instrument to optimize surface properties of these materials for specific applications, without altering their bulk properties.

The present special issue covers all the above described topics with 10 research papers.

Five of them are related to biomedical applications of titanium an magnesium alloys. Surface engineering of titanium alloys moves from the investigation of Ti/Ti-alloys wear behavior in presence of artificial saliva (paper from Alemanno et al. [1]), to bioactive inorganic coatings for the improvement of bone bonding ability of Ti alloys (Yamaguchi et al. paper [2]) and finally to surface functionalization with natural molecules (Cazzola et al. paper [3]) to improve biological properties of Ti alloys. The main criticism of Mg alloys in biomedical applications is related to their poor corrosion resistance and too rapid degradation. Two solutions are explored in the present special issue, organic dopamine functionalization (Ghanbari et al. paper [4]) or inorganic coatings (Mg oxides and carbonates, Xie et al. paper [5]).

The protection of Mg alloys from corrosion and wear is of interest also for industrial applications far from the biomedical ones, Ni-P coatings are investigated for this purpose in the Buchtik paper [6].

Protective coatings (alumina) for industrial applications on Al alloys have been investigated from the wettability and mechanical standpoints in the papers from Niedźwiedź et al. in the present special issue [7,8].

The possibility to activate Al/Al-alloys surface to optimize their joining ability has been analyzed in the paper from Ferraris et al. [9].

Finally the effect of high energy irradiation on the microstructure of Al alloys is the key topic of Wan et al. paper [10].

Conflicts of Interest: The author declares no conflict of interest.

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