
New Developments of Active-Screen Plasma Surface Engineering (Invited talk)

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Abstract

DC glow discharge plasma technology has been widely accepted in industry over the past 40 years to enhance the surface properties of ferrous materials. However, the rapid development and the uptake of the dc plasma technology into industrial surface engineering have recently been slowed down mainly due to the technical problems of DC glow discharge plasma such as arcing, edge effect, hollow-cathode effect and the limitation to treatment of non-conductive materials. To this end, a new active-screen plasma technology based on the glow discharge plasma and the post-discharge plasma emerged in the late 1990s.

The past decade has seen the rapid development of the active-screen plasma technology and this talk reports some new development of active-screen plasma surface engineering technologies including (but not limited to): (i) the advancement of scientific understanding of mechanism of active-screen plasma; (ii) active-screen plasma surface modification of such biopolymers as UHMWPE, PU and PCL; (iii) the generation of multi-functional anti-bacterial stainless steel surfaces by co-alloying of interstitial (e.g C/N) and substitutional elements (e.g. Ag/Cu); (iv) application of the active-screen plasma for duplex remanufacturing; (v) active-screen plasma activation of carbon papers for fuel cells and (vi) deposition of coatings such as CxNy.

This talk will finish with discussing the areas for future active-screen plasma surface engineering research including active-screen plasma surface modification of bio-ceramics and combined deposition/diffusion for duplex surface engineering.

Keywords: active screen plasma, coalloying, mechanisms, multifunctional surfaces

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