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Modification of graphen-like coatings by plasma and vacuum ultraviolet radiation for biomedical applications.

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Hemo- and biocompatible properties, along with high strength, chemical inertness and durability provide graphene–like materials with an edge over most antithrombogenic coatings for biomedical implants and devices. However long term interaction of proteins or living cells with the implant surface can finally lead to a strong immunological response and the ensuing cascade of biochemical reactions can adversely affect the device functionality. Therefore, it is necessary to control the long term interactions between the biomedical implant and its surrounding biological environment. Plasma and vacuum ultraviolet modification of graphen-like coatings could be employed to mitigate these adverse physiological responses to the implant material. In this investigation plasma chemical treatment in atmospheric DBD discharge and monochromatic vacuum ultraviolet irradiation was used to modify surface composition, wettability, durability and conductivity of graphene oxide films deposited on medical polymers. Chemical composition, surface energy and structure of the surface layer before and after modification were characterized by contact angle measurements, XPS and FTIR spectroscopy. It has been shown that irradiation by vacuum ultraviolet radiation result in the detachment of the C−O polar groups accompanied by an increase in the conductivity and a decrease of wettability and surface energy of the reduced graphene oxide film. On the other hand atmospheric plasma treatment leads to the formation of oxygen containing groups and increase of graphene oxide surface energy.

Keywords
graphene oxide
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