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Abstract

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The novel biocompatible graphene oxide (GO) bearing zwitterionic moiety was synthesized and characterized. The zwitterionic structures have recently gained attention in biomedical applications as materials for development of ultra-low fouling surfaces.
Generally, zwitterions contain both negative and positive charge in their structures; however the overall charge is neutral. That impart them highly hydrophilic performance; the adsorbed water then prevent the cells or bacteria to interact with surface. Graphene is two dimensional filler interesting predominantly due to high electrical conductivity. In oxidized form the electrical conductivity is compromised due to presence of hydroxyl, epoxy and carboxyl functional groups. In this work, the hydroxyl groups were utilized for anchoring the zwitterionic moiety onto the GO surface. The reaction was performed in two steps. First the silanization with (3-mercaptopropyl)trimethoxysilane was preformed to introduce the thiol functionality onto the GO surface that was reacted with sulfobetaine monomer (3-((2-methacrylamidoethyl)dimethylammonio)propane-1-sulfonate) through thiolene click reaction in the following step. The successful modification was confirmed by FTIR and TGA. Compared to neat graphene, the presence of sulfobetaine improved the graphene biotolerability for fibroblasts and pancreatic beta cells. Modification of GO surface with zwitterionic moiety prevents its negative effect on cell viability. Thus the adsorption of cells on the surface and the cell - GO surface interaction is effected. The modified GO will be used for modification of electrode at biochips construction, and the electrorheological response will be discussed as well.

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