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Modulation of Conductivity of Alginate Hydrogels Containing Reduced Graphene Oxide through the Addition of Proteins

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Modifying hydrogels in order to enhance their conductivity is an exciting field with applications in cardio and neuro-regenerative medicine. Therefore, we have designed hybrid alginate hydrogels containing uncoated and protein-coated reduced graphene oxide (rGO). We specifically studied the adsorption of three different proteins, BSA, elastin, and collagen, and the outcomes when these protein-coated rGO nanocomposites are embedded within the hydrogels. Our results demonstrate that BSA, elastin, and collagen are adsorbed onto the rGO surface, through a non-spontaneous phenomenon that fits Langmuir and pseudo-second-order adsorption models. Protein-coated rGOs are able to preclude further adsorption of erythropoietin, but not insulin. Collagen showed better adsorption capacity than BSA and elastin due to its hydrophobic nature, although requiring more energy. Moreover, collagen-coated rGO hybrid alginate hydrogels showed an enhancement in conductivity, showing that it could be a promising conductive scaffold for regenerative medicine.

Biography

Ahmed Raslan is an associate professor of neurological surgery; he manages patients with a spectrum of neurosurgical disorders, his focused practice is epilepsy surgery, brain mapping for tumours and epilepsy which often involves an awake craniotomy, surgery for chronic and cancer pain (Trigeminal neuralgia, spinal pain and much other chronic pain syndromes), and movement disorders.

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