

Design and development of smart theranostics platform based on enzyme immobilized magnetic nanocomposite hydrogel

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Abstract

Smart theranostics platform which have the ability of target drug delivery, are highly suitable systems for monitoring drug delivery, drug release, and drug efficacy. Theranostic systems successfully bring the diagnostics and therapeutics onto a single platform together. These developments have had a major impact on cancer therapy and nanomedicine and future developments can be expected. The aim of this research is designing and developing a smart theranostics platform including a smart hydrogel as a polymeric support, and a biosensor, and also imaging, and therapeutic agents. The biosensor consists of glucose oxidase (GOX) and graphen quantum dots (GQDs) which play the role of bioreceptor and fluorescence transducer, respectively. Interestingly, GOX and GQDs have other tasks. GQDs are the imaging agent, and GOX catalyze the glucose in tumor region into the hydrogen peroxide. Magnetic nanoparticles (MNPs) which are encapsulated into the hydrogel network together with GOX, act as therapeutic agents. The hydrogen peroxide produced by GOX is then catalyzed by the MNPs via Fenton-like reactions to produce highly toxic hydroxyl radicals, which could lead to tumor apoptosis and death. GQDs were prepared via one-step hydrothermal treatment and encapsulated into the hydrogel network by physical *entrapment*. Fe₃O₄ nanoparticles were prepared in the polymeric hydrogel by co-precipitation method. GOX was also loaded into the hydrogel by swelling-diffusion method.

He looks to scientific issues from different point of view, since he has worked in chemical, water treatment, Pharmaceutical and IVD industries for more than 15 years in R&D, production, QC departments, and managment teams. He is a PhD candidate in Imam Khomeini International University now.

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Biography:

Shiravan Afraz has completed his bachelor degree at the age of 22 years from Shahid Beheshti University and masters degree from Imam Khomeini International University. He has published 4 papers in reputed journals.