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Role of counterions on protein conformational change in protein-nanoparticles interaction

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Abstract

The study of protein-nanoparticles interaction is an important research area due to possibility of applications of nanoparticles in medical diagnosis and treatments, cosmetics, and so on. In spite of a large number of publications in this research area, the basic understanding of the toxicity of nanoparticles in physiological environment is not yet achieved. As a result, applications of nanoparticles in biomedicine are being delayed. Among various possibilities hyperthermia treatment for cancer cell, contrast enhancement in MRI, targeted drug delivery are under consideration. Recently, we have investigated the role of counterions (both positive and negative) associated with the functionalized magnetic iron oxide nanoparticles (IONPs) to the conformational change of the secondary structure of proteins in protein-nanoparticles electrostatic interaction. A model has been proposed which suggests a mechanism of attaching targeted proteins to the nanoparticle surface and delivering appropriate ions to modify their conformation. In this primary stage, we have studied this model for several proteins with varying isoelectric point (pI), conformation and molecular weight, and found useful. We are optimistic on future application of this model to repair denatured proteins to their functional conformation, and hence providing treatments to various diseases.

Biography

Goutam Ghosh has received his Ph.D. in 2000 from the University of Chennai, India. He joined as a postdoctoral fellow in Tata Institute of Fundamental Research (TIFR), Mumbai, in 2000. He spent an year as a JAE-Doc, CSIC, postdoctoral fellow in the Insstitute of Advance Chemistry of Catalunia (IQAC), Barcelona, Spain, in the year 2010. He is a staff scientist in UGC-DAE Consortium for Scientific research, Mumbai centre, India, since 2002. His present research interest is on the application of functional nano-materials biology and medicine. He has published more than 50 papers in reputed international journals.