Evaluation of Anticancer Activities of Gold - Chitosan Nanocomposite

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Abstract

The optical features of metal nanoparticles are due to their unique interaction with light, which give bright intense colours. In the presence of the oscillating electromagnetic field of light, the free electrons of the metal nanoparticle undergo a collective coherent oscillation. This motion is resonant at a particular light frequency and is termed as Localized Surface Plasmon Resonance (LSPR) oscillation. The electric field intensity and the scattering and absorption characteristics of the nanoparticles are all strongly enhanced at the LSPR frequency, which for silver, gold and copper show distinct and well-defined plasmon absorption in the visible region. The plasmon absorption frequency for silver, gold and copper nanoparticles were 390-400 nm, 500-550 nm and 565-570 nm respectively.

Moreover, due to the absence of band gap and the continuum of electronic states in the noble metal structures, the photogenerated electron-hole pairs can be readily recombined, which leads to deactivation of the active sites and a reduction in photocatalytic efficiency. Hence, active supports are more suitable to be used in various applications. Chitosan is a biopolymer, deacetylated derivative of chitin. Chitosan has been widely used due to its various properties such as microbial resistance, non-toxicity, biodegradability and metal ion absorptivity. The interactions of chitosan with metal ions described by three ways, i) metal chelation ii) electrostatic attraction and iii) formation of ion pairs. The use of natural biomaterials in the synthesis of nano-sized material provides an interface for the charge transfer resulting in the increase of bactericidal property. The development and application of biomaterials have been significantly influenced by advances in the field of medicine, surgery, biotechnology and materials science. The present work deals with the synthesis of bio-composite using bio polymer like chitosan. Chitosan can be used as binder to the metal. It will be very interesting to investigate the effect of anticancer activity of metal based bio-composite.