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Author: Mehdi Firouzi Reza Poursalehi Hamid Delavari
Fakhredin Saba Mohammad A. Oghabian



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Chitosan coated tungsten trioxide nanoparticles as a contrast agent for X-ray computed tomography

Mehdi Firouzi^a, Reza Poursalehi^a, Hamid Delavari H.^{a,*}, Fakhredin Saba^b, Mohammad A. Oghabian^c

^a Department of Materials Engineering, Tarbiat Modares University, P.O. Box 14115-143, Tehran, Iran

^b Department of Laboratory Science, Kermanshah University of Medical Sciences, Kermanshah, Iran

^c Department of Medical Physics and Biomedical Engineering, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Recent advances have shown that inorganic nanoparticles (NPs) based on heavy elements are highly appropriate for X-ray computed tomography (CT). In this contribution, tungsten trioxide NPs are prepared by the electrical arc discharge (EAD) method in DI water. The effect of chitosan (CTS) and glutaraldehyde (GTA) as coating and cross-linking agent, respectively, on the hydrodynamic size and zeta potential of prepared tungsten trioxide NPs is investigated. It is found that zeta potential increases by increasing the amounts of CTS. Meanwhile, by increasing the volume of glutaraldehyde (GTA), the final particle size increases whereas the zeta potential decreases. Chitosan coated tungsten trioxide demonstrated no significant cytotoxicity at concentration up to 5mg/mL after 24 h. Finally, the X-ray attenuation of prepared chitosan coated tungsten trioxide NPs are higher than *Iohexol* as the commercially available iodinated contrasting agent at the same concentrations.

Keywords: Nanoparticles; Chitosan; Tungsten trioxide; Contrast agent; Micro-CT; X-ray imaging; Surface response; Central composite design

* Corresponding author: H. Delavari H. Tel/Fax: +98 (0) 21 82883599
Email address: Hamid.delavari@modares.ac.ir

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