

Synthesis of cerium oxide nanoparticles for medical applications

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Metal oxide nanoparticles are one of the most promising materials for applications in biotechnology because of their interesting properties at nanoscale. In particular, cerium oxide nanoparticles (CeO₂ NPs) have special interest in medicine due to their catalytic activity as antioxidant agent, being able to scavenge reactive oxygen species (ROS) such as H₂O₂, OH·, O₂⁻ [1,2]. For that reason, a proper synthesis of this material is necessary and characteristics of CeO₂ NPs produced have to be evaluated before their utilization. On the other hand, CeO₂ NPs will interact with proteins both in culture media and blood torrent, especially with albumin, forming a protein-corona structure [3]. Thus, a study of conjugated CeO₂-Albumin is also required to predict their behavior in physiological media. In conclusion, synthesis of CeO₂ NPs will be responsible for characteristics of material so, studying and developing this process will be essential for taking the maximum advantage of their desired properties from cerium oxide nanoparticles for future medical applications.

[2] Hirst, S. M. et al. Anti-inflammatory properties of cerium oxide nanoparticles. *Small* 5, 2848–2856 (2009).

[3] Casals, E. & Puntès, V. F. Inorganic nanoparticle biomolecular corona: formation, evolution and biological impact. *Nanomedicine* 7, 1917–1930 (2012).

Figures

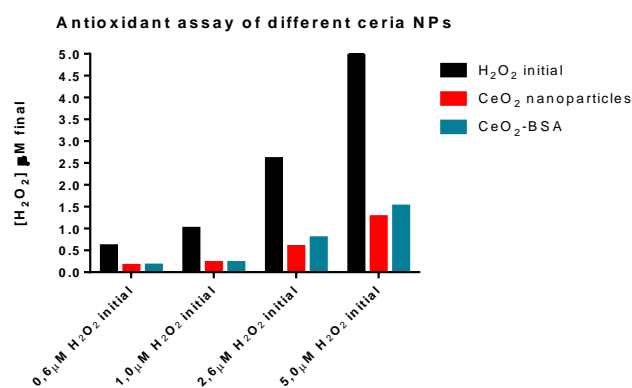
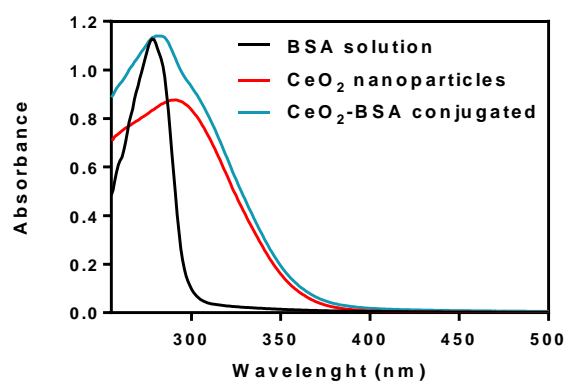


Figure 1: In the left, ultraviolet spectra of ceria nanoparticles and their conjugation with Albumin. In the right, Antioxidant assay of ceria nanoparticles and their albumin-conjugated measured by Amplex Red technique

References

[1] Celardo, I., Pedersen, J. Z., Traversa, E. & Ghibelli, L. Pharmacological potential of cerium oxide nanoparticles. *Nanoscale* 3, 1411–20 (2011).