Poster Presentation

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Nanoencapsulation of Silver-Based Antimicrobial Drugs

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Implant-associated infections still remain an issue in medicine and can cause various medical complications. In order to ensure proper host-cell integration and biocompatibility to an implant, it is essential to prevent bacterial adhesion during the critical period of 6 hours after surgery. Moreover, as the implants are increasingly used in medicine, bacteria are becoming more resistant to antibiotics, in such a way that new developments in preventing and curing infections are more than ever needed. Silver compounds and nanoparticles are gaining more interest from the scientific society as a replacement to antibiotics. However, silver compounds may be too soluble and even toxic for the host. Encapsulation might be very advantageous in order to increase the stability and biocompatibility of silver drugs. In addition, it allows a more controllable release of antimicrobial agents. In this study, ceria nanocapsules with integrated silver nanoparticles (Ag/CeO2 NCs) were synthesized according to the method depicted in the figure below. The capsules were then characterized using XRD, TEM, SEM, and FT-IR. Silver nanoparticles (Ag NPs) are visible on the surface as well as in the cavity of Ag/CeO2 NCs, suggesting that they were integrated within the ceria shell. This system can release silver during a period exceeding 3 months, which demonstrates a good release control of the antimicrobial agent. The Ag/CeO2 NCs have a low cytotoxicity towards human alveolar epithelial cells, but allow only a poor cell attachment. In order to improve the cell attachment on the nanocapsules, as well as to reduce the silver being released, a TiO2 coating around the Ag/CeO2 NCs was added to this system. This resulted in the so-called Ag/CeO2/TiO2 NCs. These novel nanocontainers were also characterized in order to evaluate the cytotoxicity and antimicrobial activity.

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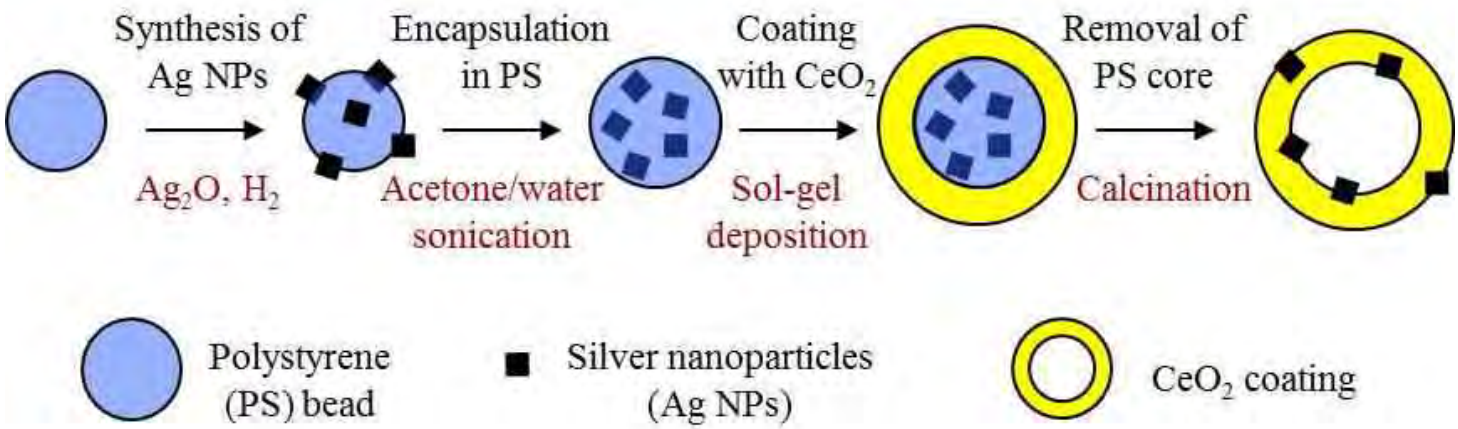

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