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Presentation title: Dextran Sulfate Coated Cerium Oxide Particles: Impact on the Aggregation State and Antibacterial Activity

Presentation type: Oral presentation

Abstract (250-300 words): Bacterial infections are very common and treated with antibiotics, but the bacteria easily become resistant and the antibiotic is no longer able to effectively eliminate the infection. In addition, antibiotics have the particularity of being poorly stable and soluble in water, reducing their therapeutic effect. It is necessary to develop vectors allowing their efficient administration. Delivery systems using particles are possible to encapsulate an antibiotic, control its release and have a greater effect on bacterial cells. Cerium oxide particles are an example of particles possessing interesting physicochemical and biological properties, notably antioxidant and antibacterial properties. On the other hand, they have the drawback of being unstable and aggregated in an aqueous environment. It is in this sense that we took advantage of their ability to be positively or negatively charged depending on the pH in order to modify the surface of the particles with a charged polysaccharide limiting the aggregation of the particles in water. Polysaccharides are promising biopolymers because of their weak toxicity and their biocompatibility. Additionally, dextran sulfate was chosen due to its ability to retain its charge over a wide pH range. Indeed, we showed a significant reduction in the size and dispersity of the particles in the presence of dextran sulfate going from 1200 nm to 280 nm and an improvement in the colloidal stability of the particles over the entire pH range. The advantage of these particles is the possibility of loading an antibiotic that is poorly soluble in water, such as ciprofloxacin classically used in the treatment of numerous bacterial infections. We showed the inhibition of bacterial growth of antibiotic-resistant bacteria (spectinomycin-resistant Escherichia coli) with cerium oxide particles coated with dextran sulfate and loading ciprofloxacin.

Biography: Clea Chesneau is a PhD student (east paris institute of chemistry and materials science/ University of Paris, France). Her core expertise is in polymer science, and surface modification. This includes the polymer modification; the study of the physical chemistry of surfaces/interfaces; and the use of controlled assembly at the sub-micrometer scale (e.g. nanoparticle). Current applications of her research are mainly for biological application.