# Stability of $SiO_2$-coated silver nanoparticles under environmental conditions - A safer by design perspective

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Silver nanoparticles (AgNPs) have been the focus of an intense research because of their wide use in commercial products but also because of their potential impact on the environment when released from their initial product. AgNPs were shown to quickly transform altering their physico-chemical properties and therefore their reactivity. In the context of using "safer by design" nanoparticles, $SiO_2$ coated AgNPs seems to be a possible candidate to consider. Indeed, the $SiO_2$ coating might improve the long-term antibacterial properties of the AgNPs over the life time of the product by slowing down its oxidation/transformation. In addition, it might also prevent the direct contact with organisms once released in the environment, limiting its toxicity. To the best of our knowledge, the stability of the $SiO_2$ coating (depending on its structure) and its impact on its protective role against transformation (oxidative dissolution, sulfidation…) has never been explored from an environmental point of view.

In this context this project propose to look at the stability of these nanoparticles in different environmental media. Physico-chemical stability of the $SiO_2$-coated AgNPs will be compared with the classicaly used polyvinylpyrrolidone-coated AgNPs. Snapshots on AgNPs solubility, $SiO_2$ coating structure and stability, particle diffusion into biofilms and toxicity will be presented.

This work is part of the SERENADE (Safe(r) Ecodesign Research and Education applied to Nanomaterial Development) project who's goal is to create a dynamic network of academic research laboratories and industry to design tomorrow's nanomaterials that are safer for both humans and the environment.