

## Design of Polymer-Silver Nanocomposites for Biomedical Applications

Milène Tan

Due to the high resistance of bacteria against antibiotics and the biomaterials-related infection, there is a critical need of designing new materials possessing antimicrobial features. Silver has then attracted much interest thanks to its broad-range antimicrobial properties while possessing low human toxicity. More interestingly, silver nanoparticles (AgNPs) are also presented as highly efficient combatants with a long-lasting activity.

In this context, new nanocomposites based on polymers and AgNPs were prepared with the aim of being used in implant applications. Three kinds of polymers were investigated: aliphatic polycarbonates, polyaspartamide and poly(N-isopropylacrylamide). The polymers were functionalized in a way to present silver binding sites allowing better immobilization of the AgNPs. The release of silver ions was studied in different solutions and for a certain time period. This property was observed to be greatly influenced by the water uptake and degradability of the materials.

As last step, their antimicrobial properties were evaluated towards *E. coli* and *S. aureus*. An antimicrobial activity in the range of  $\text{mg}\cdot\text{mL}^{-1}$  was observed. The materials were shown high potential as coating of biomaterials.

Jury:

Prof. Dr. Katharina Fromm (Thesis supervisor)

Prof. Dr. Nico Bruns (Internal examiner)

Prof Dr. Sandrine Gerber (External examiner)

Prof. Dr. Marco Lattuada (President of the jury)