

## **Photoactivate Release of Silver Nanoparticles in Cell Membrane Models for Bacterial Control**

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There is an urgent need to prevent bacterial growth in pharmaceutical and biomedical industries. We developed a polymeric nanocapsule containing Ag nanoparticles to be used as antimicrobial material. The system is activated and can release Ag nanoparticles upon applying a 405 nm LASER line (10 mW). The LASER excites the surface Plasmon Resonance of Ag Nps which change the polymeric configuration of the nanocapsules, leading to the release of Ag nanoparticles. The system was characterized by spectroscopy and microscopy techniques. We studied the interaction of Ag Nps on lipid membrane models by Sum Frequency Generation (SFG) technique, using neutral lipid (DPPC) and negatively charged lipid (DPPG). Changes in the lipid conformation was observed in both membrane models when Ag Nps were released. We used gram-negative *Escherichia coli* and gram-positive *Staphylococcus aureus* for antibacterial studies. Minimum inhibitory concentration (MIC) for the antibacterial activity of the nanocapsule solution was found to be 0,9 µg/mL, demonstrating the bactericidal effect only when the LASER is incident on the nanocapsule system. We performed the experiments under a broad range of solution concentrations and different exposition times of the LASER, revealing that 7 min of exposition is sufficient for Ag Nps release.