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System of nanofiber scaffold-polymeric nanocapsules of silver nanoparticle how novel bactericidal method in medical applications

Camilo Arturo Suarez Ballesteros and **Valtencir Zucolotto**
University of São Paulo, Brazil

There is an urgent need to prevent bacterial infections after surgical wounds and burns. We developed a system of nanofiber scaffold-polymeric nanocapsules of silver nanoparticle how tissue placed on the wounds and burns. The method consist in applied a pointer LASER 405 nm on system for controlled delivery of silver nanoparticles (AgNps) innanofiber scaffold. The LASER excites the surface plasmon resonant of Ag Nps which change the polymeric configuration of nanocapsule and allowing its release on nanofiber scaffold. This method avoids the toxic effect of the direct interaction of Ag Nps with human body and increases bacterial inhibition in surgical wounds and burns. The system was characterized by scattering electron microscopy, atomic force microscopy, fourier transform infrared spectroscopy and UV-Vis spectroscopy. We use gram-negative Escherichia coli and gram-positive Staphylococcus aureus for antibacterial study. Minimum inhibitory concentration (MIC) shows antibacterial activity of nanocapsule solution [0, 9 µg/mL], demonstrating the bactericidal effect only when the LASER is incident on nanocapsule system. AGAR diffusion shows a radius of bacterial inhibition (0.8 mm) when LASER acted over the blanket system. In the two studies, we performed the experiments with broad range of solution concentration of nanocapsule and different time exposition of LASER shows that around 5 to 7 min it found release Ag Nps for bactericidal effect. Our results suggest that the blanket system when LASER is applied has an interesting approach for development of novel bactericidal methods in medical applications.

Biography

Camilo Arturo Suarez Ballesteros received a BSc degree in Physics from Pedagogical and Technological University of Colombia (2010) and MS degree in Sciences (2012) from University of São Paulo (Brazil). In 2013 he began Doctoral studies (PhD) in Biomolecular Physics at University of São Paulo (Brazil) under the supervision of Prof. Valtencir Zucolotto. His main research interests include the development of sensor and biosensor in nanomedicine, polymeric nanofibers in regenerative medicineand synthesis and characterization of nanomaterials.

carturosuarez@gmail.com

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