

# Silver Nanoparticles containing Polycaprolactone/Polypropylene Succinate Copolymer preventing microorganism adhesion for wound healing applications

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Wound healing is a pathophysiological process consisting of three overlapping phases of inflammation, proliferation and wound maturation. In these processes, the protection of the wound area from infection is critical for successful maturation and healing. The antimicrobial activity of nanomaterials has been considered an important research area in wound healing process [1]. Antimicrobial nanomaterials are believed to accelerate the healing process by preventing the external inflammation in wound caused by the microbial infection.

In this research, polycaprolactone/Polypropylene succinate/Silver nanoparticle (PCL/PPSu/AgNP) material is proposed for preventing microbial contaminations of a wound area to improve healing process. First, PEGylated AgNPs were synthesized (Figure 1) and dispersed in PCL/PPSu copolymer structure to gain antimicrobial properties [2]. Antimicrobial activities of the newly prepared structures were then determined by observing the biofilm formation of *S.epidermidis* and *C.albicans* microorganisms and applying plate counting assay [3]. The results of the plate counting and biofilm formation experiments showed that the adhesion of microorganisms to copolymer structure has been substantially prevented by using AgNPs (Figure 2-3). Findings of this study showed the the synthesized copolymer with AgNPs as a promising candidate material for wound healing applications.

## Acknowledgements

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## References

1. Safferling, K., et al., J Cell Biol, **203** (2013) 691-709.

2. Shkilnyy, A., et al., Analyst, **134** (2009) 1868-1872.
3. Kumar, S., et al., ACS applied materials & interfaces, **7** (2015) 3237-3252.

## Figures

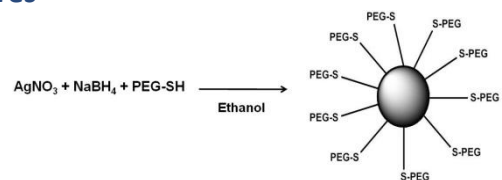


Figure 1. Synthesis of PEGylated silver nanoparticles.

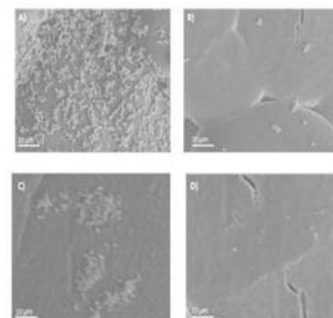


Figure 2. SEM images of the *C.albicans* and *S.epidermidis* adhesion on PCL/PPSu copolymer (A and C) and PEGylated AgNPs containing PCL/PPSu copolymer (B and D).

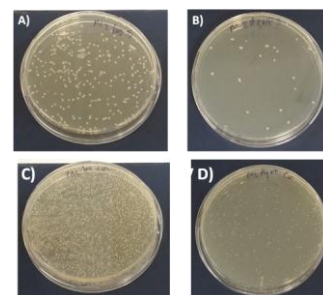


Figure 3. Photographs of the viable colonies which obtained with the plate counting test.