

Synthesis of Ag-AgCl nanoparticles capped by calix[4]resorcinarene-mPEG conjugate and their antimicrobial activity



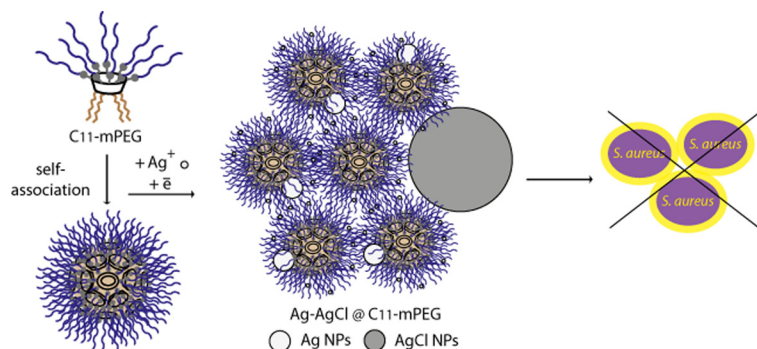
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GRAPHICAL ABSTRACT



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ABSTRACT

The growing resistance of bacteria to traditional antibiotics makes it necessary to develop new antimicrobial agents with the dissimilar mode of action such as Ag and AgCl nanoparticles. Here the synthesis of silver NPs in the colloidal solutions of calix[4] resorcinarene-mPEG conjugate C₁₁-mPEG was reported. NPs were synthesized under varied conditions: different Ag⁺/C₁₁-mPEG molar ratio, presence/absence of reducing agent (NaBH₄), in dark or LED light exposure. It was found that in all cases Ag-AgCl NPs, stabilized by C₁₁-mPEG, were obtained with the difference in the Ag NPs content and sizes. Physicochemical characteristics of the Ag-AgCl@C₁₁-mPEG NPs were evaluated by UV-vis, FT-IR, XRPD, XRF, DLS, and TEM methods. The antimicrobial activity of NPs against Gram-positive and Gram-negative bacteria and fungi was studied and the preferred antimicrobial activity against Gram-positive bacteria was found. The proposed scheme of Ag-AgCl@C₁₁-mPEG NPs and the influence of NPs content on the antimicrobial activity were discussed.

1. Introduction

Recently the extensive usage of antibiotics led to the appearance of

multi-drug resistant bacteria, and made the development of new antibacterial agents a permanent and important task. Usually, the antibacterial action of the conventional antibiotics is carried out within one

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