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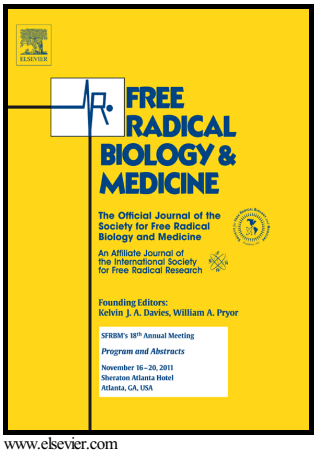

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Interfacial Assembly at Silver Nanoparticle Enhances the Antibacterial Efficacy of Nisin

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Abstract

Nisin is a well-recognised antimicrobial peptide (AMP) used in food industry. However, efficacy of the peptide has been compromised due to development of resistance in different bacterial strains. Here, efficacy of the peptide upon assembly at a silver nanoparticle (AgNP) interface has been characterized. To this end, experimental and simulation studies are done to characterize the interfacial assembly of nisin and underlie antibacterial mechanism. Being an AMP, efficacy of an intact nisin is explored against Gram-positive and Gram-negative bacteria, and compared with antibacterial propensity of the interfacially assembled nisin. Antibacterial propensity, upon the assembly, increases against both kinds of bacteria. Interestingly, the growth inhibition studies of the interfacially assembled nisin indicate that the originally nisin resistant Gram-negative bacteria become sensitive to the nanomolar nisin concentrations. Furthermore, reactive oxygen species (ROS) measurements together with confocal microscopy imaging indicate that the increase in interfacial and intracellular ROS production upon the treatment is underling mechanism of enhanced antibacterial propensity