Silver (Ag) has valuable antibacterial and purifying properties, and for centuries was used to keep potable liquids pure. It has also been used in many medical applications, ranging from wound dressings to attacking Legionnaires' disease. Its antibacterial activity depends on the balance between the activity of Ag⁺ ions, which kill the bacteria, and the total amount of Ag released from a coating. If the amount of Ag released is too high, cytotoxicity will result. The released Ag⁺ ions act by displacing other essential metal ions, such as those of calcium or zinc, from biological material. In order to enhance the antibacterial performance of Ag, it is necessary to increase the concentration of Ag⁺ ions relative to that of metallic Ag released from the coating.

Researchers from Enterprise Ireland, and Biomatech in France, have now investigated whether platinum (Pt) could enhance the release of Ag⁺ ions from antibacterial Ag coatings (D. P. Dowling, A. J. Betts, C. Pope, M. L. McConnell, R. Eloy and M. N. Arnaud, Surf. Coat. Technol., 2003, 163–164, 637–640). As Ag is more active than Pt in the galvanic (electrochemical) series, Pt should enhance Ag⁺ ion formation through galvanic action. To evaluate this, chronoamperometric experiments were performed on Ag-Pt alloys (0.5 and 3.0% Pt) in pH 8.0 borax buffer solutions containing 0.02 mol l⁻¹ HCl at 20 ± 2°C. Resulting current-time curves showed that Ag⁺ formation increased with Pt addition by up to 100%.

Antibacterial Ag and Ag/Pt coatings were deposited onto a range of polyurethane and silicone polymers using a combination of magnetron sputtering and neutral atom beam plasma sources. The magnetron sputtering target was prepared from 1% Ag/99% Pt coatings. Cytotoxicity was not observed. The released Ag⁺ ions act by displacing other essential metal ions, such as those of calcium or zinc, from biological material. In order to enhance the antibacterial performance of Ag, it is necessary to increase the concentration of Ag⁺ ions relative to that of metallic Ag released from the coating.

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