NEW TYPE OF PROTECTIVE HYBRID COATINGS CONTAINING SILVER, COPPER AND ZINC WITH AN EXCELLENT ANTIBACTERIAL EFFECT ESPECIALLY AGAINST MRSA

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Abstract

Epidemics spread many types of pathogenic bacterial strains, especially strains of MRSA (Methicillin-resistant Staphylococcus aureus), which are being increasingly reported in many geographical areas [1]. This is becoming to be a serious global problem, particularly in hospitals. Not only are antibiotics proving to be increasingly ineffective but the bacteria responsible for more than 70% of hospital-acquired bacterial infections are resistant to at least one of the drugs commonly used to treat them.

In this study, hybrid coating based on TMSPM (3-(trimethoxysilyl)propyl methacrylate, MMA (methyl methacrylate), TEOS (tetraethyl orthosilicate) and IPTI (titanium isopropoxide) containing silver, copper and zinc ions was prepared by the sol-gel method. The coating was deposited on glass, poly(methyl methacrylate) and cotton using dip-coating, and then cured at 150°C for 3 hours or, in the case of poly(methyl methacrylate), at 100 °C for 4.5 hours. The morphology and microstructure of hybrid coatings were examined by SEM. The abrasion resistance was tested using a washability tester and found to depend heavily on the curing temperature.

Seven types of bacterial strains were used to determine the profile of antibacterial activity, namely Escherichia coli, Staphylococcus aureus, Methicillin-resistant Staphylococcus aureus - MRSA (CCM 4223), MRSA-2 (CCM 7112), Acinetobacter baumanii, Pseudomonas aeruginosa, and Proteus vulgaris (according to ALE-G18, CSNI). All the samples were tested by irradiating with either a UV-A or a daylight fluorescent lamp. All types of hybrid coatings were found to possess an excellent antibacterial effect, including against the pathogenic bacterial strains of MRSA, which present a dangerous threat on a global scale.

Keywords: Hybrid coating, (3-(Trimethoxysilyl)propyl methacrylate, Antibacterial effect, Methicillin-resistant Staphylococcus aureus.

LITERATURE


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