

Preparation of ZnO/Ag Nanocomposite and Coating on Polymers for Anti-Infection Biomaterial Application

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Abstract : ZnO/Ag nanocomposites coated with polyvinyl chloride (PVC) were prepared by chemical reduction method, for anti-infection biomaterial application. There is a growing interest in attempts in using biomolecular as the templates to grow inorganic nanocomposites in controlled morphology and structure. By optimizing the experiment conditions, we successfully fabricated high yield of ZnO/Ag nanocomposite with full coverage of high-density polyvinyl chloride (PVC) coating. More importantly, ZnO/Ag nanocomposites were shown to significantly inhibit the growth of *S. aureus* in solution. It was further shown that ZnO/Ag nanocomposites induced thiol depletion that caused death of *S. aureus*. The coatings were fully characterized using techniques such as scanning electron microscopy (SEM), transmission electron microscopy (TEM) and X-ray diffraction (XRD). Most importantly, compared to uncoated metals, the coatings on PVC promoted healthy antibacterial activity. Importantly, compared to ZnO-Ag -uncoated PVC, the ZnO/Ag nanocomposites coated was approximately triplet more effective in preventing bacteria attachment. The result of Thermal Gravimetric Analysis (TGA) indicates that, the ZnO/Ag nanocomposites are chemically stable in the temperature range from 50 to 900 °C. This result, for the first time, demonstrates the potential of using ZnO/Ag nanocomposites as a coating material for numerous anti-bacterial applications.

Keywords : nanocomposites, antibacterial activity, scanning electron microscopy (SEM), x-ray diffraction (XRD)

Conference Title : ICNT 2016 : International Conference on Nanoscience and Technology

Conference Location : Barcelona, Spain

Conference Dates : August 11-12, 2016