Molecular and hybrid nanomaterials for the prevention of biodeterioration of cultural heritage objects

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Abstract

Microorganisms are highly proficient at inhabiting and decaying paper, leather and stone objects, generating serious problems for the conservation of paintings, textiles and sculptures. The associated health risks coupled with the cost of decontaminating infected artefacts, exhibition rooms and depots make this a pertinent topic for museums, local authorities and private collectors alike. Moreover, our shared cultural heritage is a social, economic and environmental resource for Europe [1]. The overall aim of our current research efforts is to engineer a range of molecular and hybrid materials with enhanced antimicrobial properties, which act to help prevent the biodeterioration of cultural heritage objects. A good example of molecules with these characteristics are the polyoxometalate ionic liquid (POM-ILs). These nanostructured materials present modular and tunable features and can act as precision biocides, and their condition at room temperature (colorless oils, waxes or gels) make them a highly appropriate compound for the cultural heritage conservation [2, 3]. Our research also demonstrates how comprehensive antimicrobial activity programs can be used to assess the activity of nanomaterials against bacterial and fungal strains commonly found infecting real objects of cultural heritage [3, 4].

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