

## Release evaluation of biocide polymers from PMMA films using SERS and UV-Visible Measurements

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### Topics

Materials-Nanotechnology

Polymer

### ABSTRACT

The term biocide refers to a substance that mainly acts by inhibiting the growth of microorganisms with harmful consequences not only to human health but also to the quality of several products. The design of novel environmentally friendly or environmentally acceptable biocidal polymeric materials represent a very intensive basic research field, related with modern technological demands, for instance the development of 'clean' surfaces for sensitive sanitary applications or alternative antifouling paints to face crucial ecological and environmental problems in marine applications. An application field of these materials is aquaculture and, mainly, marine technology and navigation. In these cases, the problem to be faced is marine biofouling, namely the accumulation and the adhesion of organisms, such as barnacle, tube worms and algae, to a surface that is in contact with water for a long time. Thus, extensive research is carried on in this field, concerning nets with biocidal properties (mainly in the case of aquaculture) or paints for submerged surfaces of the vessels (antifouling paints).

In the present work, determination of biocide polymers release rates from polymeric matrixes using UV-Visible and Raman spectroscopic techniques have been employed.

Raman spectroscopy is a widely used non-invasive technique that provides detailed molecular information and can be used as a detection tool. Surface Enhanced Raman spectroscopy (SERS) might be a more valuable detection method because it is a very sensitive technique manifested as an enhancement by many orders of magnitude of the intensity of Raman radiation by molecules in the immediate vicinity to nano-rough metal surfaces and nano-structured metal systems such as nanocolloid clusters of noble metals. This study is an attempt to introduce Surface Enhanced Raman Scattering monitoring procedures release of biocide polymers from polymeric films to compare the determination of the release rate obtained by this method with a traditional and most common technique used in quantitative analysis of controlled release as UV-vis absorption. These films are new polymeric materials with enhanced and controlled antifouling properties, which hold great promise for potential applications in the field of "clean" surfaces, either for health reasons or as fouling. Different biocide polymers [PSSAmC16, PVBCHAM and P(AcrylicAcid - co VBCHAM88)] have been incorporated into poly methyl methacrylate (PMMA) specimens.

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