Antifouling activity of novel polyisoprene-based coatings made from photocurable natural rubber derived oligomers

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Résumé en anglais	Natural rubber is a renewable resource with a potential as precursor of a very wide range of novel polymers, including polyisoprene-based surfaces with antifouling (AF) activity. In this work, new ionic and non-ionic coatings were prepared by the photocrosslinking reaction of photosensitive cis-1,4-oligoisoprenes, bearing a variable number of ammonium groups. The photochemical crosslinking was achieved using radical (via acrylate groups) or cationic (via epoxy groups) processes. Surface properties of these coatings were studied by static contact angle measurements and AFM imaging. Assessment of bioactivity demonstrated that most of the resulting coatings showed AF potential against fouling organisms: growth inhibition of marine bacteria (Pseudoalteromonas elyakovii, Shewanella putrefaciens, Cobetia marina, Polaribacter irgensii, Vibrio aestuarianus) and fungi (Halosphaeriopsis mediosetigera, Asteromyces cruciatus, Lulworthia uniseptata, Zalerion sp., Monodictys pelagica); decreased adhesion of microalgae (Navicula jeffreyi, Cylindrotheca closterium, Chlorarachnion globosum, Pleurochrysis roscoffensis, Exanthemachrysis gayraliae, Amphora coffeaeformis); inhibition of attachment and/or germination of spores of Ulva intestinalis. The best AF activity was obtained with the ionic surfaces. These new coatings prepared from precursors obtained from natural rubber are in essence active by contact. As the biocidal functions are fixed covalently to the polymer chain, detectable release of biocidal products in the marine ecosystem is prevented so that a valuable environment-friendly alternative for new AF coatings is hereby proposed.
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