OPTICAL BIOSENSORS THAT DEGRADE AFTER USE: FATA MORGANA OR REALITY?

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Abstract

Water-borne pathogens constitute a major health risk in both the developed and the undeveloped world. Cell-culture based techniques are currently preferred in the assessment of water safety. However, these methods are expensive, slow and require skilled operators. So-called Lab-on-a-Chip (LoC) technology is gaining a lot of attention as LoC devices would allow fast, straightforward, low-cost and real-time analyses to take place. Within LoC set-ups, optical detection methods are considered to be the front runners based on their sensitivity and simple sample preparation. Despite these advantages, the microfluidic components are generally designed for single-use as regeneration of the active component within the channels can be troublesome. Therefore, the application of degradable, bio-based materials as sensor substrates is proposed here to reduce the environmental impact that comes with the mass application of microfluidic sensors.

In order to design degradable, transparent and mechanically stable materials, mandelic acid has been shown to be a promising monomer due to its interesting thermal and optical properties. In the current work, O-carboxyanhydrides (OCAs) are applied as monomers as they are readily accessible in contrast to the cyclic di-esters of mandelic acid. The current contribution will highlight the copolymerisation of OCA-monomers (amongst others lactic acid and mandelic acid derived). Next, the influence of the pendant groups and the co-monomer ratios on the mechanical and thermal properties will be discussed. Finally, given the optical application, the materials' optical properties will be covered in greater detail.

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