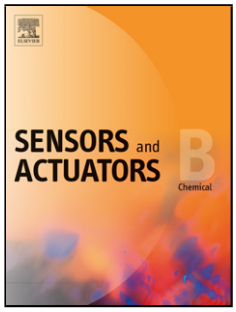

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Effect of Spacer Length on the Performance of Peptide-Based Electrochemical Biosensors for Protease Detection

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Highlights

- Effect of PEG spacer length was evaluated for enhanced analytical performance
- PEG-6 spacer provided enhanced electrode surface anti-fouling properties
- Optimisation of an electrochemical biosensor platform for monitoring protease activity
- Redox-tagged peptides with varying pegylated spacer lengths were synthesised

Abstract

Peptide-based electrochemical biosensors typically consist of a short peptide sequence, labelled with a redox reporter and modified with a thiol-containing moiety to allow immobilisation onto a gold electrode surface. A spacer is often introduced between the thiol group and the peptide with the aim of promoting enzyme accessibility as well as conferring flexibility onto the probe. Herein we report a systematic study of the effect of polyethylene glycol (PEG)-based spacer length on the performance of such biosensors in order to gain a deeper understanding of their role and optimise a peptide-based electrochemical sensor. Thus a specific peptide endowed with varying PEG spacers (PEG-4, PEG-6, PEG-8 and PEG-12) were synthesised and interrogated by the addition of both a target enzyme (trypsin) and BSA in order to evaluate their analytical performance. An alkyl-based spacer was also assessed in order to compare the effect of the nature of the spacer. All of the proposed probes supported efficient protease detection; however, PEG-6 provided enhanced anti-