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Glucose and sucrose analysis in daucus carota extract using optical tapered fibre sensor with GOU-AuNP composite layer synthesization

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Abstract
Tapered single-mode fibre (SMF) immobilized with glucose oxidase enzyme (GOD) and gold nanoparticles (AuNP) for the recognition of glucose and sucrose elements have been proposed. A tapered fibre was fabricated using a flame heating technique to improve the sensitivity of the fibre-based sensor. By taking advantage of amine groups in 3-aminopropyl triethoxysilane (APTES), GOD and AuNP are functionalized onto the tapered region of SMF through covalent interaction. The developments of the immobilized tapered fibre sensor for the analysis of glucose and sucrose concentration in different concentrations of the solution and types of carrots extracts were discussed in this paper. The solution concentrations of 0.1, 0.2, and 0.3 g/ml of glucose and sucrose were used to analyze the sensitivity of the fibre sensor. The extracts of baby carrots, imported carrots, and organic carrots were used to determine the existence of glucose and sucrose in these carrots. We demonstrated the sensitivities of GOD-immobilized fibre for 0.00672, 0.00722, 0.00902, and 0.00921 a.u/nm in terms of their glucose solutions, baby carrots, imported carrots, and organic carrots, respectively. Meanwhile, the sensitivities of AuNP-immobilized fibre were found to be 0.000030, 0.000026, 0.000012, and 0.000024 a.u/nm, respectively. © Published under licence by IOP Publishing Ltd.

Index Keywords
Fiber optic sensors, Glucose, Glucose oxidase, Glucose sensors, Gold nanoparticles, Single mode fibers; Baby carrots, Composite layer, Daucus carota, Fiber Sensor, Optical tapered fibers, Organics carrots, Oxidase enzymes, Synthesization, Tapered fiber, Tapered single-mode fibers; Sugar (sucrose)

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