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Optical fiber based acetylcholinesterase sensor with activity determination by phenol red

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Optical fibers are used in many ways for a very long time. They found applications in telecommunications and optoelectronics but also in construction of biosensors. Here, we developed method for assay of neurotoxic pesticides via inhibition of enzyme acetylcholinesterase (AChE) and coloration measuring through an optical fiber. AChE is an enzyme which splits acetylcholine into choline and acetic acid. Presence of acetic acid is detected by phenol red (PR), which gives color change from red to yellow while absorption peak of PR is decreasing with increasing concentration of acetic acid, in presence of inhibitor PR peak is increasing. Whole process was performed in cuvette holder printed on 3D printer and as source of light, LED diode was used. Absorbance was measured in absorption maximum of PR in 558 nm. Calibration curves for AChE inhibitors tacrine and carbofuran were performed in concentration range 40.00 nM to 1.25 nM in case of tacrine and 250.00 nM to 4.00 nM in case of carbofuran. Limit of detection was calculated equal to 1.18 nM for tacrine and 16.98 nM for carbofuran. The biosensor seems to be readily for practical use in proving neurotoxic pesticides in food, water and environment samples.

Biography

Adam Kostelnik has completed his MSc and PhD from University of Pardubice, Czech Republic. He has been working on "Development and innovation of biosensors for poisoning diagnosis".

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