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An amperometric PAMAM G4.0-modified cytochrome P450 biosensor with PAMAM for the concentration-based sensing of caffeine

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On this poster, we present an amperometric Cytochrome P450 3A4 (CYP3A4) Biosensor. Human hepatic Cytochrome P450s are responsible for the metabolism of the major part of xenobiotics and, among those, CYP3A4 shows the largest substrate range. This makes this enzyme an interesting target for research in many fields and is a standard test object in drug discovery. To connect the enzyme efficiently to the gold electrode PAMAM, dendrimers of generation 4 have been used that were futher modified with sub nanometer gold particles forming organic/inorganic nanocomposites. The biosensor itself was constructed by using a layer-by-layer assembly method where discrete monolayers of the respected compounds were immobilized in a sequential way due to electrostatic interactions between charged moieties. Assembly of the individual layers was monitored by QCM and FTIR spectroscopy and surface morphologies were observed by AFM. A highly reproducible assembly could be established showing less than 10% variability and in good agreement with theoretically established values for compound monolayer formation. To test the applicability of the CYP3A4 biosensor, cyclic voltammetry (CV) was used to establish electron transfer rate k_s as well as the amount of electroactive surface-constraint enzyme. Furthermore, CV was used to detect CYP3A4 substrate caffeine to ascertain detection limit (5µM) and linear range (25-100µM).

Biography

Michael Müller has completed his Diploma in Biology from Saarland University. After working as a researcher at Korea Institute of Science and Technology, Europe, he is currently doing his PhD degree.

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