

NEW POTENTIOMETRIC SENSOR BASED ON MOLECULARLY IMPRINTED NANOPARTICLES FOR COCAINE DETECTION

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Here, we present a potentiometric sensor for cocaine detection based on molecularly imprinted polymer nanoparticles (nanoMIPs) produced by the solid-phase imprinting method. The composition of polymers with high affinity for cocaine was optimized using molecular modelling. Four compositions were selected and polymers prepared using two protocols: chemical polymerisation in water and UV-initiated polymerisation in organic solvent. All synthesised nanoparticles had very good affinity to cocaine with dissociation constants between 0.6 nM and 5.3 nM. However, imprinted polymers produced in organic solvent using acrylamide as a functional monomer demonstrated the highest yield and affinity. For further sensor development, nanoparticles were incorporated within a PVC matrix which was then used to prepare an ion-selective membrane integrated with a potentiometric transducer. It was demonstrated that the sensor was able to quantify cocaine in blood serum samples in the range of concentrations between 1 nM and 1mM.

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