Fiber optic sensor based on surface plasmon resonance spectroscopy for determination of atrazine

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Abstract: A sensitive sensor device based on surface plasmon resonance (SPR) spectroscopy was developed on an optical fiber and made to be selective to Atrazine by molecular imprinting polymer. The uncladded surface of an optical fiber was coated with a thin film of gold nanoparticles by self-assembly of gold nanoparticles method. A thin and uniform film of gold was obtained. The SPR spectra were recognized by the dip of the resonance wavelength at 350 nm. The thickness of gold film was optimized by varying the soaking time of the optical fiber. The surface was further modified for selective sensing of Atrazine with the molecular imprinting polymer (MIP). The atrazine MIP template was synthesized via UV-polymerization pathway using methacrylic acid as a monomer, azobisisobutyronitrile as an initiator, and ethylene glycol dimethacrylate as a crosslinking. The MIP was tested for the selectivity with the standard atrazine compared with non-imprinting polymer (NIP). The MIP was then in-situ polymerized by dropping the pre-polymer solution on the surface of gold film coated optical fiber and putting it under UV lamp. The SPR signal was observed by the shift of the resonance wavelength. The selective sensing of Atrazine was investigated and reported.

Keywords: Fiber optic surface plasmon resonance; Atrazine; Herbicides; Molecular imprinting polymer