

Immunosensor for detection of phenyl urea herbicide diuron using electrochemical impedance spectroscopy

Vijayender Bhalla and Priyanka Sharma

Institute of Microbial Technology, India

Electrochemical impedance spectroscopy was evaluated for the detection of a small molecule such as a classical herbicide, Diuron that is widespread in the soil environment. Antibody specific for Diuron were generated in rabbit using a metabolic intermediate of the microbial herbicide degradation pathway as a hapten molecule. The antibodies were immobilized on screen printed carbon electrodes using electrodeposited gold nanoparticles for the dual role of immobilization of antibodies and signal enhancement purposes. The measurements were carried out in a direct assay platform using increasing concentrations of the herbicide diuron

and the faradic impedance was recorded at a frequency scan of 1 to 100,000 Hz. The data was fitted in to standard Randles model that shows an increase in capacitive (C_{dl}) and resistive (R_{ct}) components. The increase in C_{dl} was linked to the polarizability of the molecule and increase in R_{ct} was correlated to the hydrophobicity of the molecule that poses a barrier between solution ions and electrodes. Thus the possibility of a successful label free detection was demonstrated for routine monitoring of herbicides in water with a sensitivity =50 ppb (C_{dl}) 1 ppb (R_{ct}).

Biography

Vijayender Bhalla did MSc in Biochemistry from PGIMER Chandigarh and Ph.D jointly from CSIO (CSIR lab) and Panjab University. He did two postdocs from Bologna University, Italy and Concordia University, Montreal Canada. Presently he is the Pool Scientist (CSIR Scheme) working with Dr C Raman Suri, Biosensors laboratory at Institute of Microbial Technology (IMTECH), Chandigarh India. He has published more than 11 papers in reputed journals.

Priyanka Sharma did her Masters in Environmental Sciences from Panjab University, Chandigarh, India. She is presently working as a Sr. research fellow (UGC) for her PhD with Dr C Raman Suri at IMTECH Chandigarh. She also worked as visiting research scholar at Northwestern University for 4 months. She has 4 international papers to her credit related to detection of phenyl urea herbicides.