

Xiangqun Zeng

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Perfecting chemical sensors



Often in biomedical or environmental studies, researchers need to detect minute amounts of a chemical. Xiangqun Zeng specializes in the design and construction of exquisitely sensitive chemical sensors.

Often chemical or biological sensors rely on electrical and chemical properties of a novel material surface. Zeng currently directs a chemical and biosensor research group that focuses on electroanalysis: surface design and characterization at electrode interfaces. Surface-modified electrodes are designed with deliberately immobilized materials so that they display the chemical, biological and other properties of the immobilized molecules. The properties of the surface-modified electrodes are closely associated with the physical and chemical properties of immobilized molecules, as well as the immobilization processes. Zeng's lab focuses on the molecular design and study of several important materials, including conductive polymers, ionic liquids, carbohydrates and recombinant antibodies, which are used for fabricating new surface-modified electrodes and their applications for studying the fundamental chemical and biological binding processes. The lab is also exploring the development of improved chemical and biosensors using label free transducers and nanotechnology.

Zeng's current research is cross-disciplinary, involving electrochemistry, spectroscopy, material science, bioengineering, biology and medicine, with a focus on electroanalytical and surface chemistry at metal electrode interfaces. She has more than 36 peer-reviewed publications and two issued patents. She has received various funding to support her research including: the Cottrell College Science award from Research Corporation; American Chemical Society Petroleum Research Fund in 2001; National Institutes of Health Grants in 2002, 2004 and 2009; National Institute of Occupational Health and Safety funding in 2009; and Michigan Academic Commercialization funds in 2005. She received the Oakland University Young Investigator Research Excellence Award in 2005.

Representative Recent Publications

1. S Liu Y, Liu Y, Mernaugh R, Zeng X. 2009. Single chain fragment variable recombinant antibody functionalized gold nanoparticles for a highly sensitive colorimetric immunoassay. *Biosen Bioelectron* 24:2853-2857.
2. Yu L, Huang Y, Jin X, Mason A, Zeng X. 2009. Ionic liquid thin layer EQCM explosives sensor. *Sens Actuators B Chem* 140:363-370.
3. Yu L, Jin X, Zeng X. 2008. Methane interactions with polyaniline/butylmethylimidazolium camphorsulfonate ionic liquid composite. *Langmuir* 24:11631-11636.
4. Qiu W, Zeng X. 2008. Conductive polymer as controlled microenvironment for potentiometric high throughput evaluation of ionic liquid cell toxicity. *Anal Bioanal Chem* 392:203-213.
5. Tang Y, Zeng X. 2008. Poly(vinyl ferrocene) redox behavior in ionic liquids. *J Electrochem Soc* 155:F82-F90.
6. Shen Z, Yan H, Zhang Y, Mernaugh R, Zeng X. 2008. Engineering peptide linker for scFv immunosensors. *Anal Chem* 80:1910-1917.
7. Shen Z, Huang M, Xiao C, Zhang Y, Zeng X, Wang GP. 2007. Nonlabeled quartz crystal microbalance biosensor for bacterial detection using carbohydrate and lectin recognition. *Anal Chem* 79:2312-2319.
8. Shen Z, Yan H, Zhang Y, Parl F, Mernaugh R, Zeng X. 2007. Recombinant antibody piezoelectrode sensors for the detection of CYP1B1 (Cytochrome P450 1B1). *Anal Chem* 79:1283-1289.