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Selection of inorganic binding peptides with electroactive properties by phage display techniques for biosensor applications

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Abstract

For biosensor devices, functionalizing the surface with covalent linkers is usually employed. However, it is difficult to avoid the loss of activity following the bioreceptor-analyte binding event, which limits the lifetime of the device. The goal of this research is to use phage display to biopan for inorganic binding peptides that are reversible upon application of an electric field, which can provide dynamic functionalization of surfaces, as well as self-cleaning devices. For example, when the bioreceptor becomes clogged, the peptides may be released by triggering an electric field to generate a non-binding state. A fresh surface of bioreceptors can then be applied via a flow through setup. Our group has been panning for peptides that bind strongly to indium zinc oxide (IZO), a transparent conducting oxide, which makes it an attractive electrode for biosensors. Two approaches toward biopanning for reversible binders are being examined. In one method, an electro-releasing device is being used to collect the strong binding peptides that are released. In an alternative method, because a strong-binding peptide might not be a reversible peptide, our group has also developed a novel phage display biopanning protocol with an electro-elution process instead of the regular chemical elution, where a microdevice is used during the biopanning process. Current studies include the comparison of these two approaches for the goal for developing self-cleaning biosensor devices.

Biography

Ya-Wen Yeh is currently a Doctoral student in Dr. Laurie Gower's group in the Department of Materials Science and Engineering at University of Florida. Her research interest is in molecular recognition in organic-inorganic hybrid materials. She received her M.S degree in Biomedical Engineering from University of Florida in 2009, and B.S in Bioengineering from Tatung University in Taiwan in 2007.