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Strategy for constructing antifouling biosensors

Biosensors commonly suffer from seriously non-specific protein adsorption while measuring real samples in human serum and consequently lead to unreliable responses. To improve the accuracy of detection, biosensor modified with an antifouling surface is indispensable. Though many strategies for reducing non-specific interaction have been developed, the task has not been solved with an acceptable outcome. In particular, after installing the biorecognizers, such as antibodies, for specific targets, the anti-fouling feature of a biosensor is commonly destroyed. How to overcome this problem becomes a main issue of biosensing. We propose and demonstrate an effective protocol via electrodeposition of charged-aniline derivatives for the fabrication of biosensors with promising antifouling ability. The antifouling layer, denoted as (N+S) layer, was constructed on various electrodes via electrodeposition by using the mixture (1:1 molar ratio) of two opposite charged-aniline derivatives, 4-amino-N, N, N-trimethylanilinium (N) and 4-aminobenzenesulfonate (S). In order to know the power of antifouling of (N+S) surface, we compared its cyclic voltammetric property and the feature of human serum adhesion with the common antifouling surfaces (zwitterionic layers and poly ethylene glycol layers). All the tested surfaces gave similar antifouling power. Yet, the (N+S)-modified surface showed excellent conductivity. The antifouling efficiency of the (N+S) surface is greatly improved with the addition of 1 % sarcosine in human serum as compared with other tested surfaces. On top of the "charged layer", isothiocyanate moieties can be added on with the desired density with which scFvs in the form of proteins or, even better, peptides will be immobilized on the surface of sensor. The standard protocols of screening with phage display library or ribosome display library will be briefly discussed.

Speaker Biography

Yaw-Kuen Li received his PhD degree from Tulane University, USA, in 1991. After his postdoctoral research in School of Medicine of Johns Hopkins University, he moved back to Taiwan to start his academic career in 1993. He was promoted to a full professor in 2002. Further, he became the chair of the department in 2004 and the Dean of college of science in 2014. His primary research interests include three major fields: (a) Enzyme-based catalytic biological reactions, (b) Bio-recognition and Bio-sensors, (c) Solid-state/biological interface chemistry.

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