

Conducting polyamic acid membranes for sensing and site-directed immobilization of proteins

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Poly (amic) acid (PAA) is a functionalized conducting polymer substrate that provides electrochemical detection control of biospecific binding. In this work, we report a biosensor platform based on the PAA for oriented immobilization of biomolecules. The PAA was used to covalently attach biomolecules, resulting in a significant improvement in the detection sensitivity. The biosensor sensing elements comprise a layer of PAA antibody (or antigen) composite self assembled onto gold (Au) electrode via N-hydroxysuccinimide (NHS) and 1 ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC) linking. The modified PAA was characterized by Fourier transform infrared (FTIR), ¹H nuclear magnetic resonance (NMR), and electrochemical techniques. Cyclic voltammetry and impedance spectroscopy experiments conducted on electrodeposited PAA on Au electrode using ferricyanide produced a measurable decrease in the diffusion coefficient compared with the bare electrode, indicating some retardation of electron transfer within the bulk material of the PAA. Thereafter, the modified PAA surface was used to immobilize antibodies and then to detect inducible nitric oxide synthase (a pain biomarker) and mouse immunoglobulin G (IgG) using enzyme-linked immunosorbent assay (ELISA), surface plasmon resonance (SPR), and amperometric techniques. ELISA results indicated a significant amplified signal by the modified PAA, whereas the SPR and amperometric biosensors produced significant responses as the concentration of the antigen was increased.

Biography

Naumih M. Noah completed her Ph.D. from the State University of New York at Binghamton on May, 2012 where she studied New Concepts in Pain Detection and Management using biochemical principles. She has published 8 papers from her Ph.D. work. She is currently lecturer of Analytical/Bioanalytical chemistry at Kenyatta University in Kenya. She is interested in developing biosensors for rapid and sensitive detection of infectious and neglected tropical diseases and integration of nanotechnology with health care in developing countries starting with Kenya.

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