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Commentary

The Role of Diaminonaphthalene Polymers in Biomolecule Sensors

Hana Chiyo*

Department of Biomoecules, Kyoto University, Kyoto, Japan

DESCRIPTION

Recent advances in synthetic polymer chemistry have led in the creation of potentially different conducting polymers with applications ranging from industry to biology. Among many conducting polymers, Poly Diaminonapthalene(PDAN) and its derivatives have emerged as interesting materials for building bio/chemical sensors and have demonstrated potential in quantitative and qualitative assays of a wide range of bioactive compounds. However, despite the fact that this typical polymer and its monomers have remarkable physicochemical features, no complete information about their sensing properties. It provides an overview of Diaminonapthalene (DAN) and its polymer-based nanostructured bio/chemical sensors as well as insights into their functionality, structural composition, and manufacture. Bio and chemical sensors are now widely used in medical and environmental investigations for sensing changes in the environment, biological disturbances, food poisoning and processing, water contaminations and diagnostic objectives of social and commercial importance.

The current pandemic, COVID-19, emphasizes the importance of developing biosensors that will aid in the testing of numerous differentiable diseases other than corona, allowing clinicians to make secure and timely clinical judgments. At the same time point-of-care testing lowered irrelevant mental fatigue and patient medical expenses. "Bio or chemical sensors are self-contained integrated devices capable of supplying specific quantitative or semi-quantitative analytical information employing a biological and chemical recognition element" according to the IUPAC authority (biochemical receptor) There are numerous Conducting Polymer (CP) based bio/chemical sensors accessible that offer low cost, easy availability, biodegradability, mobility and high sensing speed. Furthermore the detection method of bio sensing is improved by modifying the inherent properties of conducting polymers by doping nanomaterial's, demonstrating the interfacial cohesiveness between the active layers of CP and the high surface area of doped nanoparticles.

Some of the key features of conducting polymers that allow them to function as bio/chemical sensors are chromatographic separation, chiral separation, intermediation between sensing electrodes and drug screening. The bulk of conducting polymers have an extended conjugated backbone structure that permits functional groups to stack specific molecules and also detaches mobile charge carriers from binding molecules. The significant delocalization of unpaired electrons across aromatic systems, particularly in polymer oxidizing states, increases their conductivity up to the metallic range. The electrochemical characteristics of conducting polymers cause biological components to immobilize on solid surfaces allowing sensing molecules to cling to the transducers. The electro-chemical polymerization approach has been widely utilized to polymerize diaminonaphthalene derivatives because it is a reliable and simple process for growing conducting polymers on electrode surfaces allowing for well-defined and finely regulated polymer deposition. However, this approach has some disadvantages including low production a single type of film a tiny surface area and a low reactivity to metal ions.

The spectrofluorimetric approach determines nitrite through two fundamental processes fluorescence quenching and fluorescence yield. Protein Disulfide Isomerase (PDI) is an enzyme that helps to fold proteins. Formaldehyde is a well-known air contaminant that is frequently employed in construction materials and a variety of household items. It causes various disorders and has been studied for micro-level sensing purposes. The electrochemical luminescent method is useful for the examination of environmental and industrial samples such as hazardous metals, trinitrotoluene, nitro aromatics and their byproducts, heavy metals, biomolecules. This approach detects electro-generated species on electrode surfaces using the property of luminescence caused by energetic electron transfer (redox) reactions. This approach employs a variety of electrodes including voltammetric, potentiometric and impedimetric electrodes.

Correspondence to: Hana Chiyo, Department of Biomoecules, Kyoto University, Kyoto, Japan, E-mail: chiyo@gmail.com

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