

Modifications of polymer membranes towards advanced chemical sensors

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Polymers as materials found a great number of applications due to their unique properties, opportunities of their physicochemical and mechanical modifications. This paper presented selected applications of modified polymeric membranes in some fields of chemical sensors, illustrating based on three types of these analytical devices as examples.

In order to achieve certain ion-selectivity of membrane there is need to immobilize proper electroactive components to optimized polymer membrane. Supramolecular chemistry brings several tools to transduce of ion recognition by receptors molecules into chemical sensing [1].

A commonly used plasticized poly(vinyl chloride) (PVC) membrane matrix showed several serious limitations with respect to lifetime in various applications. There have been several attempts to solve these problems by the application of various plasticizers, ionophores, and anionic sites with an increased lipophilicity, and in a few cases by covalent binding of the ionophore to the polymer matrix [2]. Membrane materials other than plasticized PVC have also been investigated, such as polyacrylates, polyurethanes, and polysiloxanes [3]. Some novel examples of applications of these membrane materials to design ion-sensitive chemical sensors are presented.

Apart of ion-selective electrodes based on modified polymeric membranes, more efforts were focused on chemically modified field effect transistors (CHEMFETs), that combine miniaturized devices with advanced modifications of polymeric membranes. Several methods of reagent immobilization in chemically sensitive layers of fiber optic chemical sensors as third type of devices are presented.

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