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DEVELOPMENT OF QUANTUM DOT-BASED SENSING MEMBRANES FOR DETECTION OF HYDROGEN PEROXIDE

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In this study, the carboxyl group functionalized CdSe/ZnS quantum dots (QDs) and melamine-formaldehyde resin particles captured aminofluorescein (AF) were synthesized. They were conjugated with the sol-gel mixture of glycidoxypropyl trimethoxysilane (GPTMS) and aminopropyl trimethoxysilane (APTMS) for the fabrication of hydrogen peroxide sensing membranes. CdSe/ZnS QDs joined the redox reaction of hydrogen peroxide via the reductive pathway involving the electron transfer to an acceptor that resulted in fluorescence quenching of QDs, whereas aminofluorescein (AF) was used as a reference dye. Herein, the ratiometric fluorescence of QDs and AF was proportional to the concentration of hydrogen peroxide. The sensing membrane could detect hydrogen peroxide in the linear detection range of 0.01-1.0 mM and 1.0-10 mM. The sensitivity of the sensing membrane was increased at low concentrations of hydrogen peroxide by immobilizing horseradish peroxidase (HRP) on the surface of the sensing membrane. The sensing membranes with or without immobilization of HRP showed high sensitivity and selectivity.

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