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Colorimetric Sensor for Formaldehyde Detection Using Thiol-Functionalized Polydiacetylene and Zinc Oxide Nanocomposites

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Formaldehyde detection is an important method to protect harmful effect on human health. This study aimed to develop a colorimetric sensor for detecting formaldehyde based on thiol-functionalized polydiacetylene (PDA) and zinc oxide (ZnO) nanocomposites. PDA/PDA-SH/ZnO liposomes exhibit a color change from blue to red in the presence of formaldehyde in the range of 100 to 1000 ppm. This color change was easily visualized by the naked-eye and optical absorption spectroscopy. With increasing concentration of formaldehyde, the absorption intensity at 640 nm dramatically decreased, and new absorption peak appeared at 540 nm. The colorimetric response value increase when the concentration of formaldehyde was increased. In addition, the quantitative color change of PDA/PDA-SH/ZnO sensor can be extracted using color RGB images captured by a smartphone. These results suggest a possibility to develop PDA/PDA-SH/ZnO sensor for detecting formaldehyde in real applications.

Keywords: Polydiacetylene, Conjugated Polymer, Nanocomposites, Formaldehyde Detection, Colorimetric Sensors, Digital Image

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