



Recent advances in sensing toxic nerve agents through DMMP model simulant using diverse nanomaterials-based chemical sensors

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ABSTRACT

Recent terrorist assaults have demonstrated the need for the exploration and design of sustainable and stable chemical sensors with quick reaction times combined with great sensitivity. Among several classes of chemical warfare agents, nerve agents have been proven to be the most hazardous. Even short-term exposure to them can result in severe toxic effects. Human beings inadvertently face the after-effects of these chemicals even several years after these chemicals were used. Due to the extreme toxicity and difficulty in handling, dimethyl methylphosphonate (DMMP), a simulant of nerve agents with much lesser toxicity, is frequently used in laboratories as a substitute. Having a chemical structure almost identical to those of nerve agents, DMMP can mimic the properties of nerve agents. Through this paper, authors have attempted to introduce the evolution of several chemical sensors used to detect DMMP in recent years, including field-effect transistors, chemicapacitors, chemiresistors, and mass-sensitive sensors. A detailed discussion of the role of nanomaterials as chemical sensors in the detection of DMMP has been the main focus of the work through a comprehensive overview of the research on gas sensors that have been reported making use of the properties of a wide range of nanomaterials.