Conductive Paper Sensor based on Screen-printed Polyaniline/graphene Patterns for Nerve Agent Detection

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Herein, we report a high-performance sensor capable of effectively detecting nerve gas, a type of chemical warfare agent (CWA), was realized by conductive paper with polyaniline (PANI) nanofiber and graphene sheet. To realize the high-performance nerve gas sensor, DMMP was used as a model gas of nerve gas, and the conductive paper sensor that can detect DMMP at a concentration of ppb within a few seconds. Improvements in electrical properties and sensor performance of conductive papers were realized by the addition of optimized amounts of graphene and PEO. In addition, P(VB-co-VA-co-VAc) copolymer significantly improved the intermolecular forces between PANI nanofiber, graphene sheet, and cellulosic paper. Conductive patterns containing PANI nanofiber/graphene cofillers were fabricated into sensor electrodes of various sizes and shapes by screen printing. The prepared conductive papers were exposed under DMMP at various concentrations of at least 3 to at most 30000 ppb.