

Carbon nanotubes and graphene oxide applications in optochemical sensors

ABSTRACT

Simple and sensitive ethanol sensors based on uncladded plastic optical fiber (UCPOF) and tapered silica fiber coated with carbon nanotubes (CNT) and graphene oxide (GO) thin films have been developed for detecting different ethanol concentrations at room temperature. Simple and low-cost techniques were used for the fabrication of the proposed optical fiber sensors. The developed probes were coated with CNT and GO using drop-casting and dip-coating techniques. Experiments demonstrated that the CNT-based UCPOF and GO-based tapered fiber tip sensors show significant sensitivity to aqueous ethanol with superior selectivity to ethanol among different organic compounds. CNT-based UCPOF sensor shows better sensing performance compared with the GO-based tapered fiber because of the absorbance sensing mechanism. The excellent sensing performance of the developed modified optical fiber sensors toward ethanol indicates their high efficiency to be used in practical applications for ensuring safety necessities in the industrial fields.

Keyword: Fiber-optic sensors; Modified optical fiber; Carbon nanotubes; Graphene oxide; Absorbance response; Ethanol sensor