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Review on the graphene based optical fiber chemical and biological sensors

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Abstract

Graphene as a novel material has laid a foundation for its applications in optical fiber sensors, due to its unique properties, especially the optical properties. On the other hand, optical fiber sensors have received world-wide attention due to their high sensitivity, small size, good anti-electromagnetism disturbance ability and other potential advantages. In this paper, the developments of graphene in the applications of optical fiber sensors were reviewed from four aspects. Firstly, the common preparation methods of graphene were introduced. Next, the optical properties of graphene have been concluded. And then, some typical optical fiber chemical and biological sensors based on graphene, such as temperature sensors, biological sensors and gas sensors, were reviewed. It was shown that graphene had a great potential in the optical fiber sensing technology. Furthermore, the deficiencies and challenges of the graphene in the applications of optical fiber sensors were analyzed. In a whole, the unique advantages of graphene have present their versatility and importance in the application fields of optical fiber sensors.

Abbreviations

CVD	chemical vapor deposition
HOPG	highly oriented pyrolytic graphite
SC	sodium cholate
GO	graphene oxide
SiC	silicon carbide
DOS	density of states
SPR	surface plasmon resonance
GQDs	graphene quantum dots
SMF	single-mode fiber
rGO	reduced graphene oxide
FP	Fabry-Pérot
FSR	free spectral range
DXB	Biotinylated Double Crossover DNA
SA	protein Streptavidin
POF	plastic optical fiber

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