Chemical Sensors Based On Carbon Nanofiller

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Abstract

Protecting living organisms from the harmful effects of toxic gases relies heavily on the ability to detect these threats quickly and accurately. This underscores the urgent need for the development of advanced gas sensors capable of operating efficiently under ambient conditions. Ideal sensors should combine simplicity of design, low manufacturing costs, and high sensitivity, making them not only effective but also accessible for widespread use. Advancements in this field are critical for ensuring environmental safety and human health.

Carbon nanomaterials are widely utilized in sensor technologies due to their exceptional chemical, molecular, and physical properties. However, their practical application is often limited by synthesis-dependent variability and handling complexities. To overcome these challenges, carbon nanomaterials are frequently embedded into polymer matrices, which not only enhance their processability, but also impart additional benefits, such as improved thermal stability, mechanical durability, and electrical conductivity.

In this study, polymer composites incorporating a hybrid filler of graphene and multiwalled carbon nanotubes (MWCNTs) were fabricated using an emulsion mixing technique. The gas-sensing performance of the resulting composites was evaluated by measuring their sensitivity to varying concentrations of ammonia gas. The results highlight the potential of these hybrid nanocomposites for the development of cost effective, high-performance gas sensors operating under ambient conditions.

Keywords

Chemical sensors, carbon nanofiller.