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*Abstract*

# Advancement of electrospun carbon nanofibers in sensor technology for air pollution detection†

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**Abstract:** The use of electrospun carbon nanofibers (ECNs) has been the focus of considerable interest due to their potential implementation in sensing. These ECNs have unique structural and morphological features such as high surface area to volume ratio, cross-linked pore structure, and very good conductivity, making them well suited for sensing applications. Electrospinning technology, in which polymer solutions or melts are electrostatically deposited, allows the production of high-performance nanofibers with tailored properties, including fiber diameter, porosity, and composition. This controllability allows the use of ECNs in sensing applications to be optimized, resulting in improved sensor performance and sensitivity. While carbon nanofiber mats have potential for sensor applications, several challenges remain to improve selectivity, sensitivity, stability and scalability. Sensor technologies play a critical role in the global sharing of environmental data, facilitating collaboration to address transboundary pollution issues and fostering international cooperation to find solutions to common environmental challenges. The use of carbon nanofibers for the detection of air pollutants offers a variety of possibilities for industrial applications in different sectors, ranging from healthcare to materials science. This brief review provides insights into the latest developments and findings in the fabrication, properties, and applications of ECNs in the field of sensing. The efficient utilization of these resources holds significant potential for meeting the evolving needs of sensing technologies in various fields, with a particular focus on air pollutant detection.

**Keywords:** Sensors; Electrospun Nanofiber Mats; Carbon Nanofibers; Air Pollutant Detection.

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