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Electrospun nanocomposite nanofibers in chemical sensors for air pollution detection

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Statement of the Problem: Environmental monitoring is a growing concern in both developed and non-developed countries across the globe, because of the strong impact of several anthropogenic activities on both human and planet health. Air quality monitoring, indoor and outdoor, is usually performed with specialized equipment and analytical methods by regulatory agencies and researchers. However, in order to obtain more realistic and continuous results on the situation of pollutants distribution, EU projects guidelines report the need to involve also citizens in environmental monitoring, thus low-cost and easy-to-use technologies are required. To achieve this aim, novel sensors for environmental monitoring have been designed and developed to date to obtain reliable values comparable to those provided by standard methods and technologies. Methodology & Theoretical Orientation: Currently, electrospinning is considered as one of the most versatile and inexpensive manufacturing technologies to design and develop nanostructured sensors to detect gases and volatile organic compounds (VOCs) in the air. Sensors based on polymeric as well as metal-oxide fibers look extremely attractive for the low cost and great versatility of the raw materials that can be easily tunable, according to the transducer used and the application of interest, taking part to the resulting sensing features (selectivity and sensitivity). The inclusion of variously working nanoparticles with different strategies of functionalization has allowed the sensors to achieve excellent performances under various points of view, ranging from robustness, to life-time, to sensitivity and selectivity. Thus optical and electrical features can be exploited to reveal traces of gas and chemicals in air by simple to use, fast and cheap sensing devices. Conclusion & Significance: Due to their ease of preparation and tuning of their sensing features, electrospun nanofibrous based sensors are expected to be a new generation of promising smart nanosensors for VOCs and gases.

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