

Air filtration and Respiration Monitoring using Electrospun Nanofiber Membranes Modified with Ni-Based Conductive Metal Organic Frameworks

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We developed a nanofiber membrane that blocks particulate matters (PMs) and monitors respiration. The membrane was composed of polyacrylonitrile (PAN) nanofibers and was prepared by electrospinning. An electrically conductive metal organic framework (MOF) was synthesized directly on the nanofiber by a two-step hydrothermal reaction. Both membranes achieved similar filtering efficiency (>99%) for fine dust particles, but the hybrid membrane more efficiently filtered incense smoke containing oil droplets derived from combustion gases, because the oil droplets became more wetted on the MOF-grown nanofibers than on the PAN nanofibers. Moreover, in a moist air flow (i.e., a breath flow), the electrical resistance of the hybrid membrane changed with the flow rate, indicating its suitability for respiratory monitoring.