**Tuning electrical properties of hybrid polymer/ionic liquid electrospun nanofibers by ions exchange for air filtration**

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Electrospun membranes were demonstrated to offer high efficiency for capture of airborne particulate matter thanks to their native narrow pore size and high specific surface area. The capture of bio-aerosols and low molecular weight toxic compounds, including volatile molecules is however limited because they tend to evaporate or vaporize very easily into air. Physisorption may be controlled by interaction forces altering the electrical properties of the materials and physically engineering an adsorbent surface. The development of hybrid polymer/ionic liquid materials with controlled charges may offer a solution to this problem. In this work, poly(diallydimethylammonium chloride) (DACMAC) and poly(acrylonitrile) (PAN) were engineered in order to yield a versatile platform for selective anion exchange. Various anions including TFSI-, SCN-, PF6-, and BF4- were used to replace the Cl- across the native ionic liquid and affect the overall material charge and ability to strongly electrostatically bind with contaminant molecules. Electrospun nanofibers were immersed into LiTFSI, KSCN, KPF6 and NaBF4 solutions for anion exchange. The results showed that the exchange not only affected the streaming potential and charge, as well as the hydrophilicity of the materials but also the chemical and thermal stability of the fibres, making these novel hybrid materials into advanced platforms for volatile airborne contaminant capture.

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