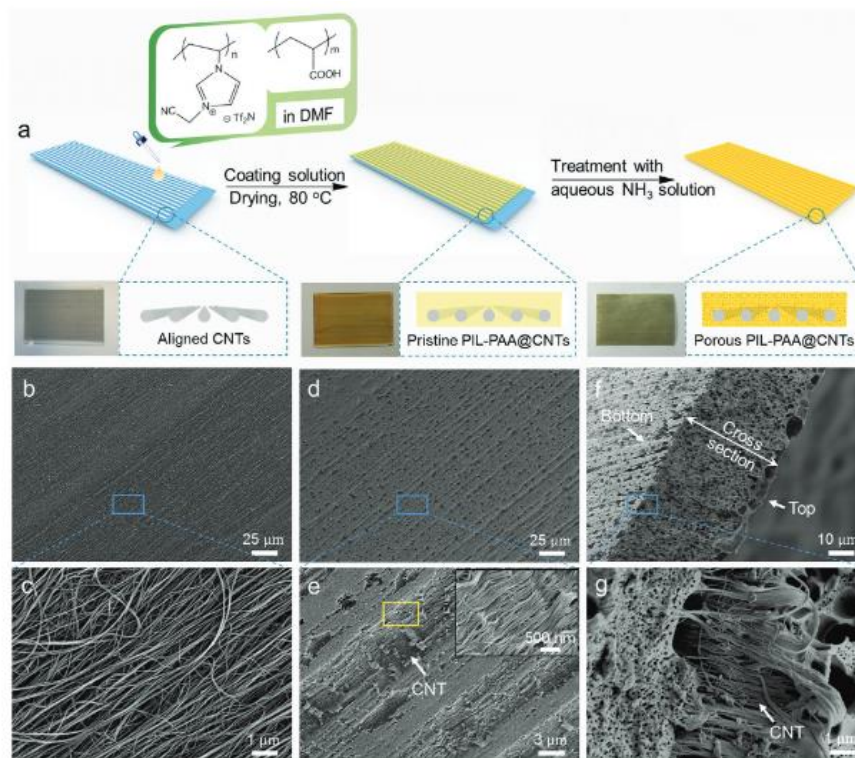


# Programmable Actuation of Porous Poly(Ionic Liquid) Membranes by Aligned Carbon Nanotubes

## Abstract

A porous composite membrane, combined poly(ionic liquids) with aligned carbon nanotubes that shows anisotropic actuation toward organic solvent is developed. The membrane actuator shows rapid and reversible actuation in response to acetone vapor as well as improved conductivity. These properties allow the composite membrane to be organic solvent-induced actuator as well as a power switch.



**Figure 1.** a) Schematic illustration of the fabrication of the composite porous membrane PIL-PAA@CNTs. b,c) SEM images of bare aligned CNT sheets in low and high magnifications. d,e) SEM images of PIL-PAA@CNTs from bottom view in low and high magnifications. Inset is the SEM image of the region marked with a yellow box in part (e). f,g) SEM images of PIL-PAA@CNTs from side view in low and high magnifications, respectively.