

## Carbon nanotubes based mixed matrix membrane for gas separation

### Abstract :

Mixed matrix membranes (MMM) combine useful molecular sieving properties of inorganic fillers with the desirable mechanical and processing properties of polymers. The current trend in polymeric membranes is the incorporation of filler-like nanoparticles to improve the separation performance. Most MMM have shown higher gas permeabilities and improved gas selectivities compared to the corresponding pure polymer membranes. Carbon nanotubes based mixed matrix membrane was prepared by the solution casting method in which the functionalized multiwalled carbon nanotubes (f-MWNTs) were embedded into the polyimide membrane and the resulting membranes were characterized. The effect of nominal MWNTs content between 0.5 and 1.0 wt% on the gas separation properties were looked into. The as-prepared membranes were characterized for their morphology using field emission scanning electron microscopy (FESEM) and Transmission Electron Microscopy (TEM). The morphologies of the MMM also indicated that at 0.7 % loading of f-MWNTs, the structures of the MMM showed uniform finger-like structures which have facilitated the fast gas transport through the polymer matrix. It may also be concluded that addition of open ended and shortened MWNTs to the polymer matrix can improve its permeability by increasing diffusivity through the MWNTs smooth cavity.