

Title: Metal organic framework based mixed matrix membranes for effective water sequestrating device encapsulations

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Abstract:

To increase the lifetimes and reliability of electronics, it is vital to reduce the permeation of water into these devices to prevent the onset of various degradation mechanisms. Current barrier materials utilise polymer entanglement, filler particles or multi-barrier architectures to achieve this.

Metal organic frameworks (MOFs) present a novel opportunity to act as porous fillers due to their versatility, large surface areas and chemical tunability. Incorporating water-scavenging MOF particles into the polymer matrix reduces the overall water vapour transmission rate (WVTR) by capturing any contaminants as well as blocking potential pathways for diffusion through the polymer membrane. This ensures not only a reduction in transport rate but a simultaneous reduction in the concentration of contamination ingress.

This work involves the development of a composite material, MOF membrane, in the form of MOF-infused polymer films, as a high-efficiency encapsulation system to address the limitations of current encapsulation materials. Post-synthetic surface modification improves dispersibility and suitable MOF-loadings to maintain transparent films are also investigated.

Keywords: encapsulation, metal- organic frameworks, mixed-matrix membrane,

on www.imstec2022.org): Yes / No