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Reproducible method for porous poly (vinyl alcohol)/sodium alginate (PVA/Na-alginate) membrane synthesis

Noel Peter Bengzon Tan

Nano and Advanced Materials Institute Ltd., Hong Kong

Porous polymers have gained high attention recently due to the material's combined properties of porosity and its polymeric material. Due to these synergistic properties, its applications have been widespread in gas adsorption and storage, gas separation and selective permeation, adsorption of organic pollutants, catalysis and photoconductors, molecular motor, clean energy and food safety. Although this field is emerging and expanding, there is still need to improve the synthetic method further to lead a more green and environment-friendly approach while not compromising its potential significant scalability. This study demonstrates an easy yet environment-friendly approach by using biopolymeric materials, namely, Sodium Alginate and Poly (vinyl alcohol). Aside from being sourced from sustainable resources, its synthesis involves direct crosslinking chemistry in an aqueous system with simultaneous pore forming strategy by salting method. This straightforward methodology was created to ensure its future amenability to large-scale production. The PVA/Na-Alginate composite membrane resulted into uniform and well-defined macroporous polymeric sheets. Diameters range from 10 to 50 microns. Synthetic process parameters (e.g., soaking time, temperature, pH, solvent choice) were experimentally optimized to produce a consistent and reproducible quality of membranes. Characterizations include SEM, FTIR, and TGA. Figure 1 gives the overall schematic diagram of the synthesis of PVA/Na-Alginate membrane. Figure 2 shows SEM images of the membrane. This type of membrane is specially made as part for Time- Temperature Indicators (TTI) that the group is developing.



Figure 1: Schematic diagram on the synthesis of Poly(vinyl alcohol)/Sodium alginate (PVA/Na-Alginate).

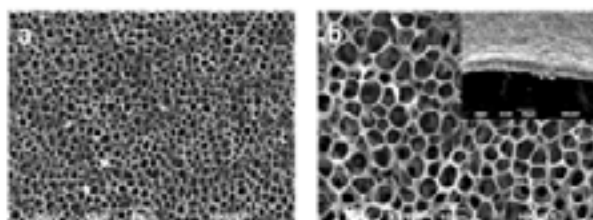


Figure 2. SEM images of PVA/Na-Alginate membrane a) in 50 μm magnification b) in 10 μm magnification, inset b shows the cross-sectional view of the film and its pore consistency.

Biography

My subject area is in the synthesis of polymers, biopolymers and metal/polymeric nanocomposite particles and its applications. Syntheses of these polymers and its nanocomposites are focused on the search for more environment-friendly approaches. Environment-friendly approaches encompass the idea of Green Chemistry without compromising its potential for large-scale production. Applications of these polymers and nanocomposite particles range from catalysis, drug delivery, coating, environmental remediation, food safety and building construction materials.

bengzontan@nami.org.hk

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