Intrinsically Microporous Polymers in Electrochemical Processes

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Polymers of intrinsic microporosity (or PIMs) have been developed over the past decade as molecularly rigid and highly processable materials that are readily applied to electrode surfaces or employed as free-standing membranes. Two prototypical PIMs are PIM-1 [1] and PIM-EA-TB [2] (see Figure below). Both possess rigid molecular backbones and pack into porous solid/glassy films with high surface area and with typically 1 nm pore size [3].

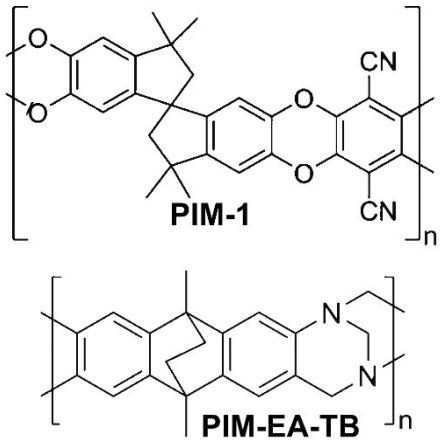

Figure 1: Molecular structure for PIM-1 and for PIM-EA-TB.

PIMs have been introduced into electrochemical applications in energy storage devices [3] and in sensors [4]. They provide fertile ground for fundamental studies on ion transport and electroosmotic water transport [5]. Intrinsic microporosity leads to binding and transport with size selectivity and chemical selectivity. Binding of gases into nanoparticulate PIM materials is responsible for localised gas activity increases under triphasic conditions (solid|liquid|gas for oxygen [6] or for nitrogen [7]). Localised storage of gases has been reported for example for hydrogen [8].

References

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