

NEW VARIATIONS OF THE OLD ‘PHASE INVERSION’ PROCESS: SNIPS, CIPS, DIPS AND MORE

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The non-solvent induced phase separation (NIPS) and also the drying induced phase separation (DIPS) for membrane formation is since its first description by Zsigmondi and Bechold nearly 100 years old. But the process is still young and nearly weekly we see new formulations for novel membrane structures. This membrane formation method gets especially interesting when combined with additional physical or chemical processes. The non-solvent induced phase separation can be coupled with self-assembly of nanometer-sized colloidal micelles resulting in asymmetric membranes with pores down to 2 nanometer; or the NIPS process can be accompanied by metal complexation or chemical reactions leading to skinned membranes with unique properties. When the drying induced phase separation invented by Zsigmondi and Bechold is applied to concentrated block copolymer solutions complex asymmetric structures with a hierarchical pore structures can evolve. A new generation of membranes with unique properties can be manufactured using these “hybrid” formation methods. Recent developments and challenges will be introduced and discussed in this lecture.