

## Phase separated structures of concentrated polymer solutions

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# PHASE SEPARATED STRUCTURES OF CONCENTRATED POLYMER SOLUTIONS

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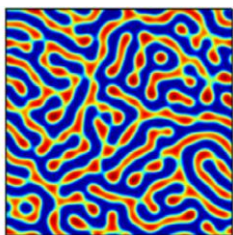
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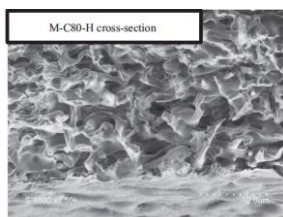
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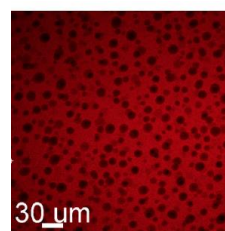
Phase separation of concentrated homopolymer solutions is both of fundamental interest (the large difference in viscosity/elasticity of the two phases can lead to unusual behaviors) and of practical importance (novel porous structures can be made by this process). I will first review how 2D phase-field simulations (Fig.1) reveal the influence of the mobility dependence with concentration for capturing features of phase separation like growth laws.[1] On the experimental side I will examine various water-soluble polymers and show how anomalous phase diagrams seem to be closely connected to unusual features of arrested-like phase separation as evidenced by light scattering and confocal microscopy. Thin films of these polymer solutions were used for making membranes (Fig. 2), avoiding the use of organic solvents. [2, 3, 4] The case of homo-polyelectrolytes is also of great interest since the theory is still controversial, as I will briefly recall. First results will be presented about phase separation upon changes in salt concentration, polymer concentration and temperature for a polyelectrolyte whose structure is also promising for membranes.



**Figure 1** – 2D Simulation of phase separation in polymer solution



**Figure 2:** Membrane made by phase separation of a PVA solution



**Figure 3:** Confocal image of a phase separating polyelectrolyte

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