**Bicontinuous interfacially jammed emulsion gels (bijels) for application in water desalination**

As water scarcity poses a growing threat for several parts of the world, there is a pressing need to increase our water supply through purification of unconventional water resources such as seawater. [1] Membrane separations have been widely implemented to this end due to their high energy efficiency. One of the most important types of separation membranes are desalination membranes. The size of the pores in these membranes is such that water molecules can pass the membrane, but hydrated salt ions and other solutes are rejected. In combination with reverse osmosis technology, these membranes yield fresh water.

Our group is actively working on the preparation of bicontinuous interfacially jammed emulsion gels (bijels) using solvent transfer-induced phase separation (STRIPS). [2] In STRIPS, a mixture of water, oil and solvent undergoes spinodal demixing upon solvent removal. In this demixing process, an interpenetrating network of the two fluids is formed. Coarsening of the network is arrested by adsorption of nanoparticles onto the fluid-fluid interface. The obtained bijel typically has a large internal surface area.

The aim of this project is to design bijels that facilitate desalination of water through reverse osmosis. The large internal surface area is expected to make the reverse osmosis process in bijels highly efficient. To achieve this, we plan to generate a semi-permeable membrane within the bijel. Subsequently, the mass transport across the membrane will be studied in order to optimize the bijel structure and obtain the maximum process efficiency.

[1] J.B. Werber, A. Deshmukh, M. Elimelech, *Environmental Science & Technology Letters* **3**, 112-120 (2016)

[2] M.F. Haase *et al.*, *Nature communications* **8**, 1-7 (2017)