

Bio-inspired Membranes

Where Simulations meet Experiments

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Biomimetic Electrodialysis Membranes

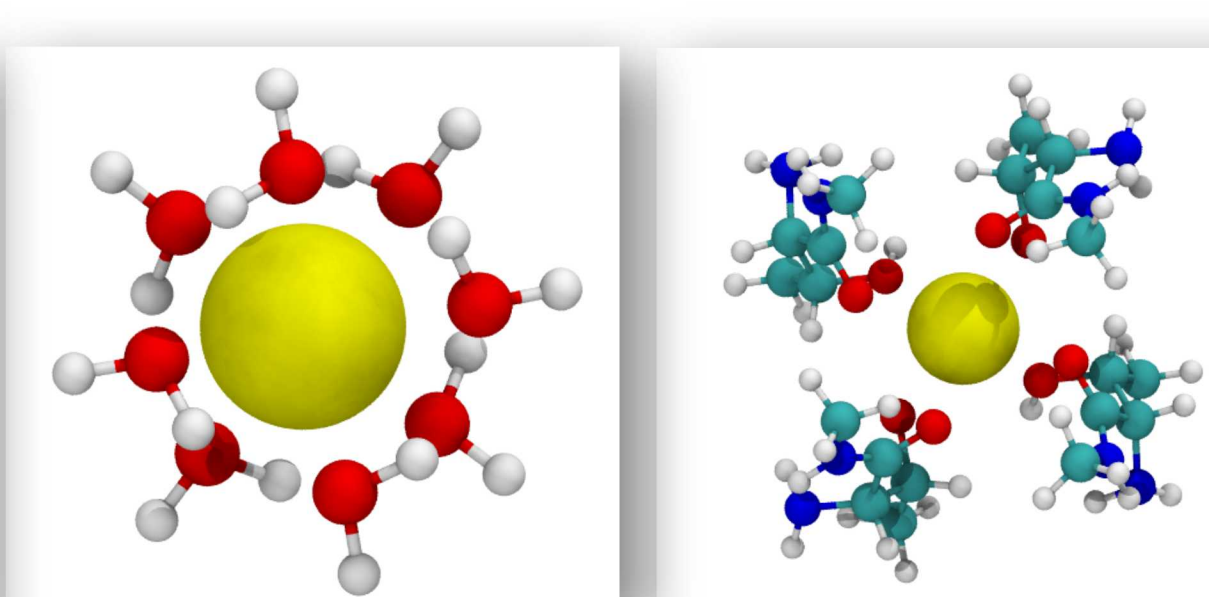
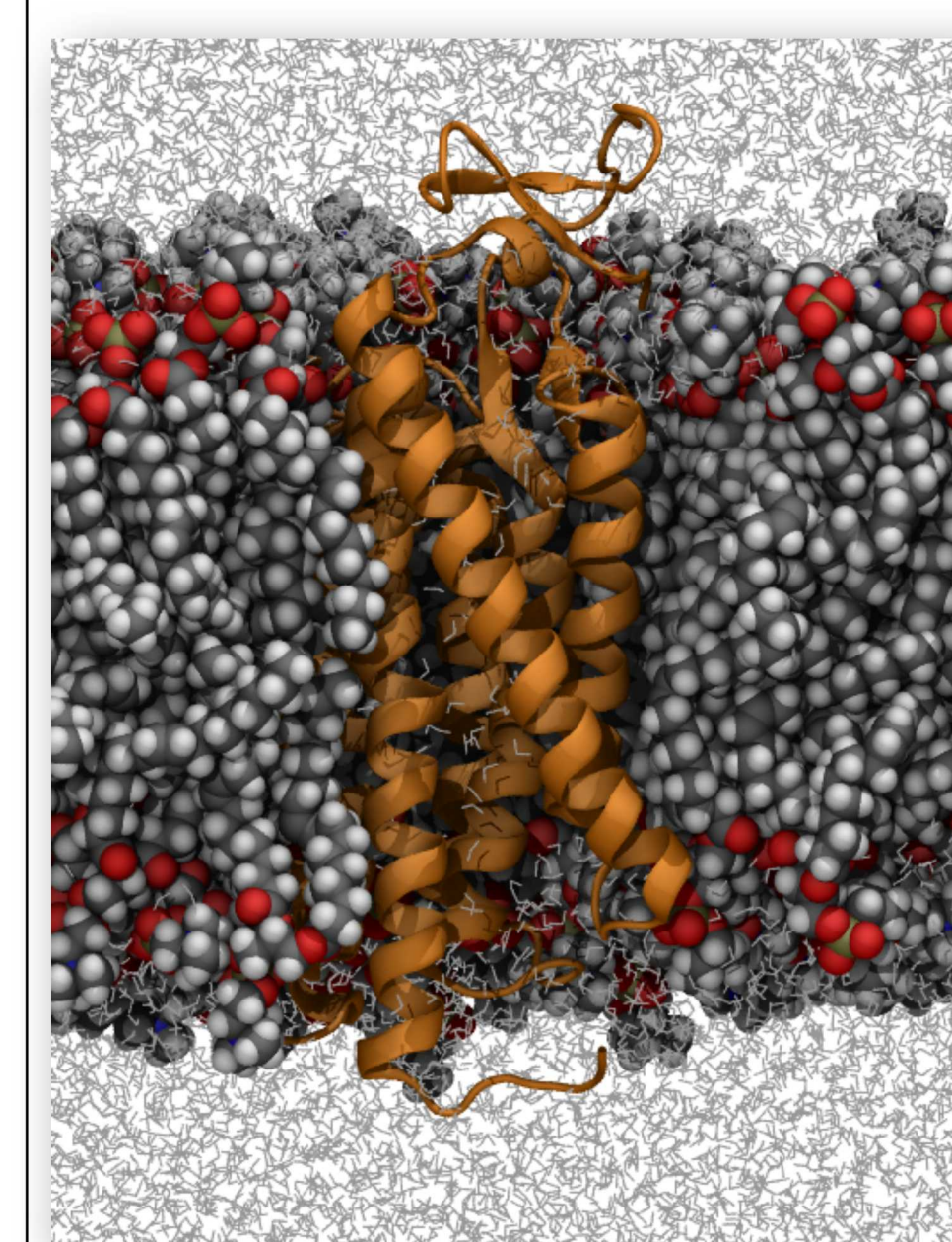
Due to ever increasing demand for fresh water and the limited resources available, recycling of contaminated water and tapping unconventional water sources are necessary. Desalination of water by reverse osmosis is a promising technology for producing clean water, but is limited by cost. We are focusing on electrodialysis, a membrane technology for desalination of brackish water. Electrodialysis (ED) uses electric current and ion-exchange membranes to separate ions to produce clean water.

Clean water is a National security priority and tapping into unconventional water sources requires high throughput membranes. Our team combines biological fast ion-transport mechanisms into synthetic systems to create highly-efficient biomimetic electrodialysis membranes.

Current ED membranes are not efficient enough for commercial sustainability. Our advanced, ultra-thin, highly selective bio-inspired membranes will reduce the cost of ED to make it a viable and sustainable technology. Synergetic work between molecular simulations and experiments enable us to advance ion-exchange technology for electrodialysis application.

Molecular simulations

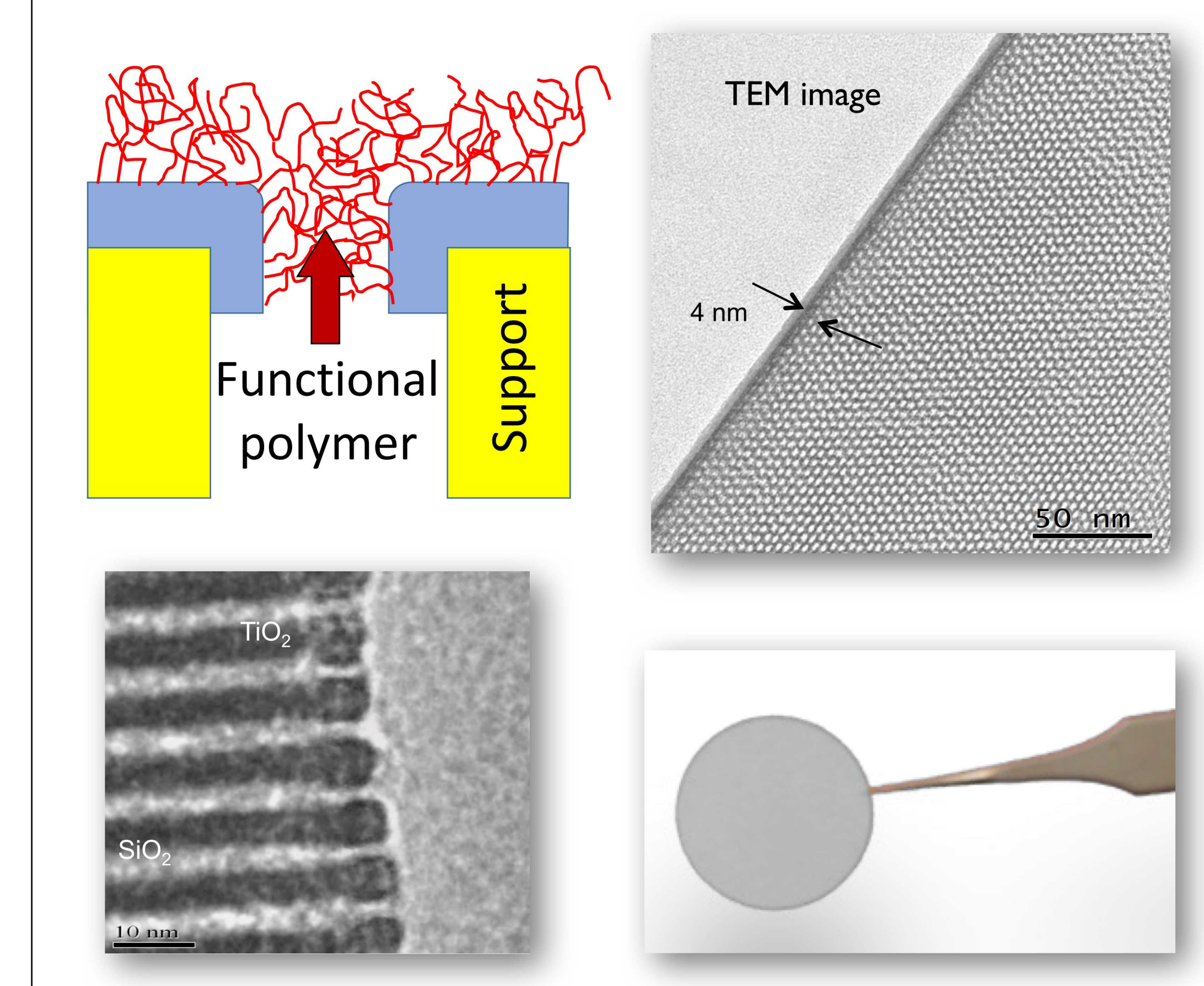
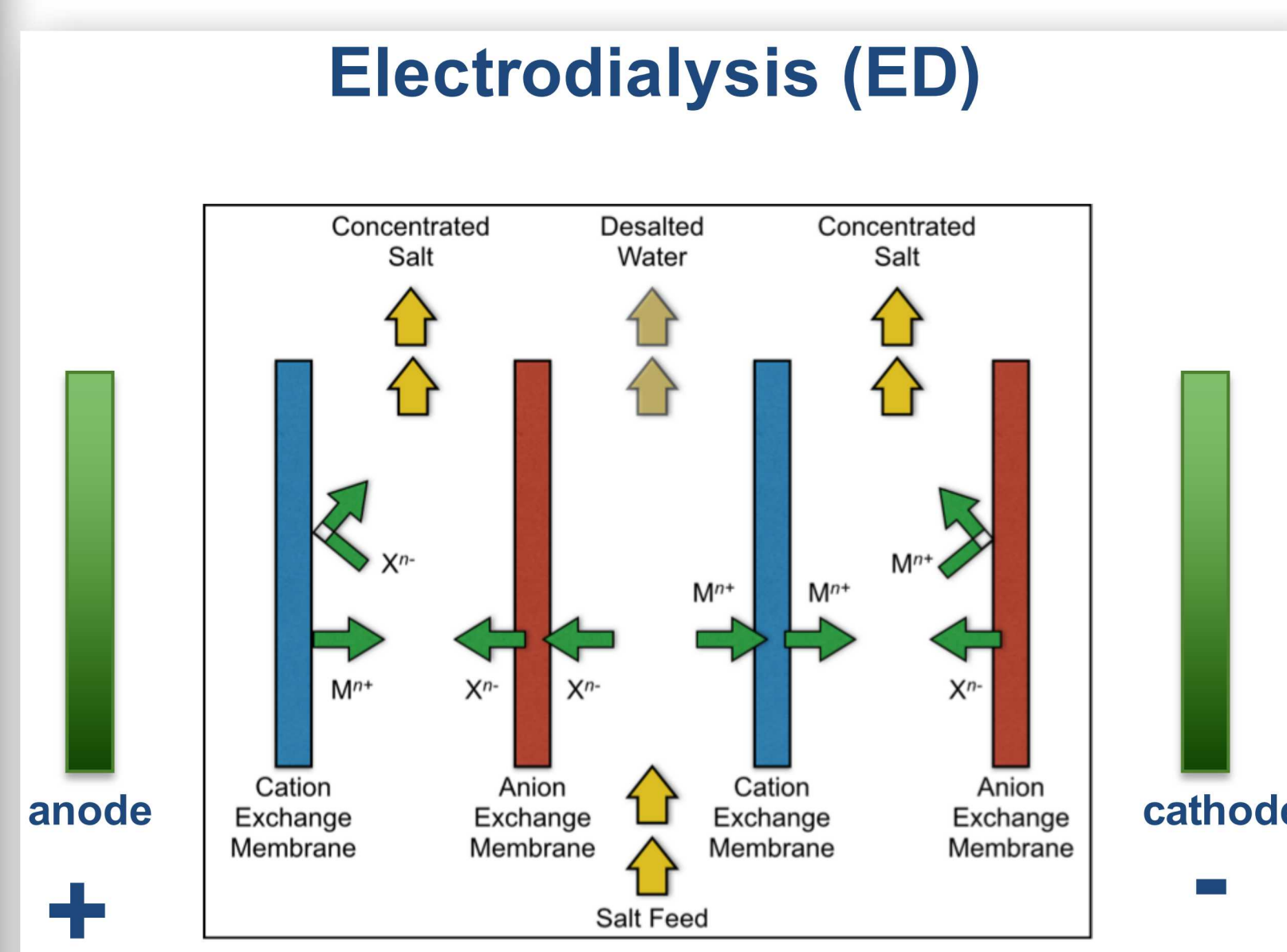
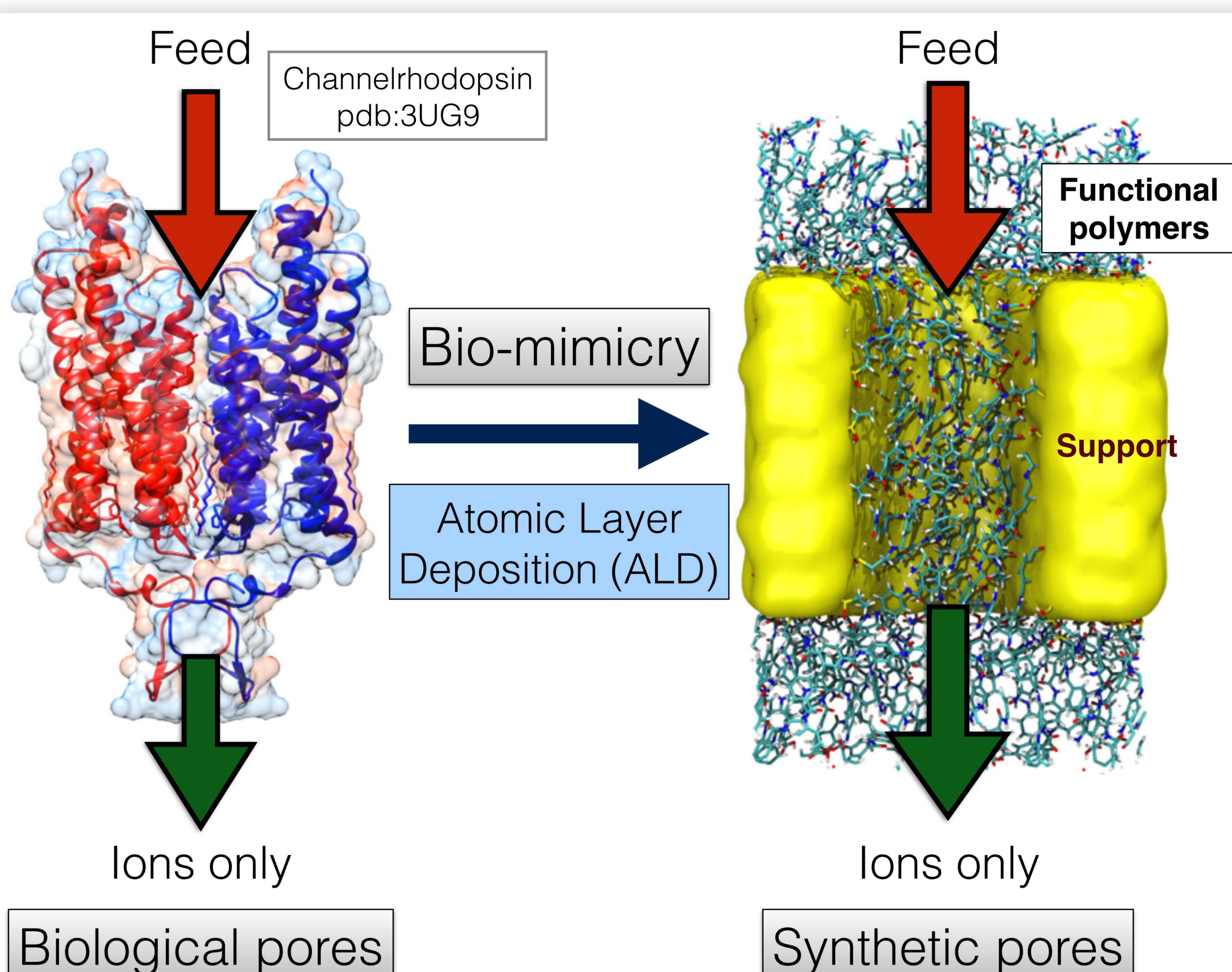
Molecular simulations inform the basic underlying mechanism of fast ion transport in biological ion channels. This information is then translated to experimental synthesis of ion-exchange membranes.



Simulations allow calculation of free energy of ions in water and at the binding sites of ion channels

Atomic Layer Deposition

Atomic layer deposition allows precise control of pore size and pore functionality. Highly precise arrangements of functional groups mimic biological ion channel behavior.



Water logo
placeholder



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