**Supramolecular ion transporters – synthetic tools for engineering functional lipid bilayer membranes**

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Ion transport across lipid bilayer membranes mediated by membrane proteins is a fundamental process in biology. Synthetic supramolecular systems embedded within lipid membranes provide readily accessible chemical tools for engineering functional membranes. Synthetic ion transport systems in particular have applications as potential therapeutics for channelopathies, tools for probing biological systems and regulating flow of material in and out of artificial cells. Stimuli-responsive ionophores – those that can be switched on and off in response to external triggers such as light - show promise for achieving spatio-temporal control over ion transport processes.[1] Our group are interested in developing stimuli-responsive ionophores and membrane confined catalysts that are activated by a range of stimuli, including light[2] and redox environment[3], as well as exploring unusual interactions such as halogen and chalcogen bonding to mediate transmembrane anion transport.[4]

In this talk, I will present some of our recent work on developing synthetic transmembrane transporters for ions. In particular, I will discuss our recent work on photo-responsive ion transporters incorporating molecular photoswitches, such as those based on ion transport relays (Figure 1)[5], as well as those utilising photo-caged transporters for applications including catalyst transport and inter-cellular signalling[6].

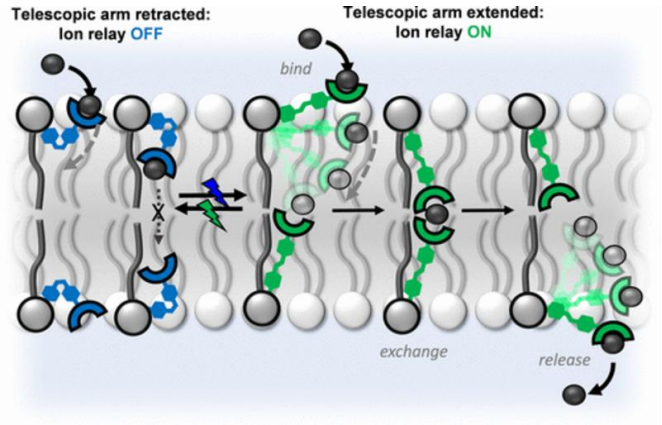


Figure 1. A photoresponsive ion transport relay using lipid anchored photoswitches.

References

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(6) *J. Am. Chem. Soc.* 2024, **146**, 7, 4351–4356; *Angew. Chem. Int. Ed*., 2023, **62**, e202309080