



## pH regulation in enzyme-droplets: from bioinspired dynamics to applications

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One of the most important control parameters in cellular systems is pH, used to switch on certain synthetic pathways and processes such as biomineralisation. Cells have numerous methods for regulating internal pH, with membrane potential playing a key part in the transport rates of species. Enzyme-encapsulated systems have been widely used for bioinspired synthesis and artificial cell studies, but the influence of mass transport and electrochemical gradients on these reactive processes are not often considered.

Here, we explore acid/base catalysed processes in compartmentalised enzyme systems including liposomes and double emulsions. Using simulations and experiments, we determine how pH is governed by a combination of catalytic rate, and chemical and electrical gradients across membranes. The influence of mass transport on feedback-driven behaviour, including pH oscillations and collective dynamics driven by chemical communication between droplets is discussed. These studies aid in understanding how life-like properties in synthetic cellular systems might be used in materials and sensing applications.

**Wednesday, December 11<sup>th</sup>, 2024 at 2:15 pm**

Prandtl lecture hall and  
Zoom Meeting ID: 959 2774 3389  
Passcode: 651129, [direct link](#)

