



Special Issue on **Computational Modelling of Ion Transport in Cellular Signalling**

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Myriads of cellular processes depend on spatiotemporal distributions of molecular components and are regulated in nanodomains that are defined by intracellular structures. Recent advancements in microscopy enhance the resolution and reconstruction of these microdomains, thus permitting detailed assessment of cellular components and providing necessary input for novel computational modelling methodologies which serve to unravel and ascertain their functional roles in shaping cellular behaviour. Collectively, these tools allow for a biophysical understanding of cellular milieu *in its native state* and its pathological modification during diseased conditions. Indeed, continued improvements in high resolution microscopy and computational modelling have facilitated the analysis of intracellular signalling events in near molecular detail. However, while structural data are crucial to computational modelling, the localization of key proteins as well as the kinetics of signalling reactions and second messenger fluxes are equally important.

Ion channels and transport proteins are perhaps the most fundamental interface between cells and their environment. This makes understanding their function a vital part of understanding human physiology. From the understanding of how K^+ channels affect insulin secretion to the role of nutrient transporters in cancer growth, and the involvement of Ca^{2+} channels in gene expression, to understanding metabolic signalling in cardiomyocytes, and so on, microscopic activities in the cell help to elucidate the macroscopic function of the body. Clearly, research into ion channels, transporters, and signalling underpins our understanding of cellular activity, organ function, and disease and inspires the development of new therapy.

This special issue focuses on recent advances in microscopy and computational subcellular modelling with a special focus on ion translocation, kinetics of transport proteins, and ion signalling microdomains that are crucial to cellular processes. We invite authors to contribute papers on any area of the below listed topics or other related areas.

Potential topics include, but are not limited to:

- ▶ Mathematical modelling and simulation of cellular signalling
- ▶ Kinetics of ion transport
- ▶ Ca^{2+} imaging
- ▶ Lipid-related messengers
- ▶ Lipid bilayer reconstitution
- ▶ Intracellular trafficking
- ▶ Membrane-membrane interactions
- ▶ X-ray crystallography
- ▶ Super resolution microscopy

Authors can submit their manuscripts via the Manuscript Tracking System at <http://mts.hindawi.com/submit/journals/cmmm/cmit/>.

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