Frontiers in ion channels and nanopores: where technology and biology meet

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Ion channels act as nanoscale switches allowing a highly regulated flow of ions across biological membranes, which explains their crucial role in key processes like muscle contraction, heartbeat, and nerve signal propagation. On the other hand, technologies based on **artificial nanopores** have been developed for several applications, including protein sequencing, energy storage, capture of pollutants, and High Performance Liquid Chromatography.

In the last few years massive research efforts have been devoted to replicate in solid state nanopores the gating and selectivity properties of biological ion channels. The development of efficient **biomimetic nanopores**, however, still faces several challenges. A key problem for instance, is the capture of analytes which stirred much interest in electrokinetic processes along with the new field of iontronics that, using ions as signal carriers, fosters the ambition to design neuromorphic circuits for next generation computing.

A special attention has also been devoted to **cellular membranes**, whose peculiarities are involved in several of the extraordinary properties of biological pores. Among the potential applications of this field is the use of extracellular vesicles for targeted drug delivery and the control of fusion processes to prevent viral infections.

In the spirit of fostering interdisciplinary discussion and cross-fertilisation, this workshop brings together leading and emerging scientists in the field of ion channels, nanopores, and membrane biophysics. The speakers are selected among renowned experimentalists, theoreticians, simulators, and technologists. The informal atmosphere is intended to promote the interaction of young researchers with leading scientists.

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