Plug and play electrophysiology

Fluxion Biosciences is using Tecan's Freedom EVO® platforms to offer high throughput solutions for patch clamping studies, based on its advanced Well Plate Microfluidics™ system.

Fluxion Biosciences in South San Francisco, California, provides cellular analysis tools for the pharmaceutical and biotechnology industries. Compound screening for drug discovery requires high throughput techniques, allowing large libraries of potential therapeutic agents to be assessed in parallel. Manual patch clamping methods are the 'gold standard' for live cell electrophysiology studies, yet these techniques are time-consuming and labor-intensive, making large-scale studies infeasible. Fluxion uses its proprietary Well Plate Microfluidics (WPM) technology to offer automated patch clamping for electrophysiology, helping researchers investigate ion channels as possible therapeutic targets.

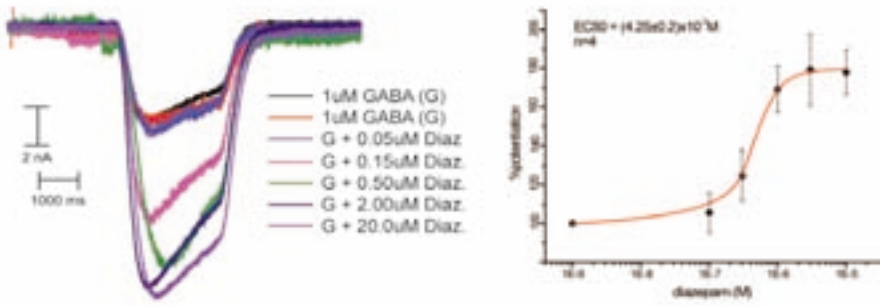
The Company's IonFlux™ HT automated electrophysiology system offers high performance patch clamping in an automation-friendly plate format, permitting high throughput electrophysiology studies. Mike Schwartz, Marketing Director at Fluxion, explained: "Ion channels are an important yet under-represented class of therapeutic target, due to the unsuitability of most patch clamping techniques for candidate drug screening. The IonFlux system – with its 64-channel amplification circuitry – offers automation of 32 separate electrophysiology experiments in parallel. The WPM design means that, once the plate has been loaded into the reader, all steps of the experiment are automatically performed, in duplicate, helping to improve reliability and minimize variation."

To further increase the throughput capacity of the IonFlux system for its customers, and minimize the need for user intervention, Fluxion is working with Tecan to integrate the system into the Freedom EVO series of liquid handling workstations. "Automated plate preparation using the Freedom EVO platform can significantly enhance the efficiency of electrophysiology workflows," Mike continued. "Several IonFlux instruments can be multiplexed on a single workstation, with the platform handling all the plate preparation, reagent pipetting and logistical needs of all the instruments. The system's liquid handling (LiHa) arm is able to perform all the pipetting operations required to fill each plate with cells and reagents, and the robotic manipulator (RoMa) arm can load and unload plates from the IonFlux readers. The Freedom EVO can then prepare the next plate while the IonFlux analysis cycle is running, offering customers virtually continuous operation if required, and a much higher throughput than could be achieved manually."

"When selecting a liquid handling platform to automate plate preparation for the IonFlux system, we were keen to offer a highly integrated solution that could be tailored to the needs of individual customers. The Freedom EVO series of workstations is highly flexible and customizable, allowing fully integrated electrophysiology workflows for a range of throughputs. Our standard Freedom EVO set-up has a four-channel liquid

Representative application for the IonFlux HT. Response of a cell ensemble exposed to 1.0 µM GABA co-applied with increasing concentrations of diazepam (marketed as Valium®). Diazepam acts on the GABA ion channel receptor to decrease neuronal activity for clinical indications such as anxiety and epilepsy.

Each diazepam concentration is pre-incubated for 1 min before the GABA co-application. The positive modulation of mean GABA-sensitive currents (n = 4) during exposure to increasing diazepam concentrations is shown. A hill fit provides an EC50 of 425 nM.



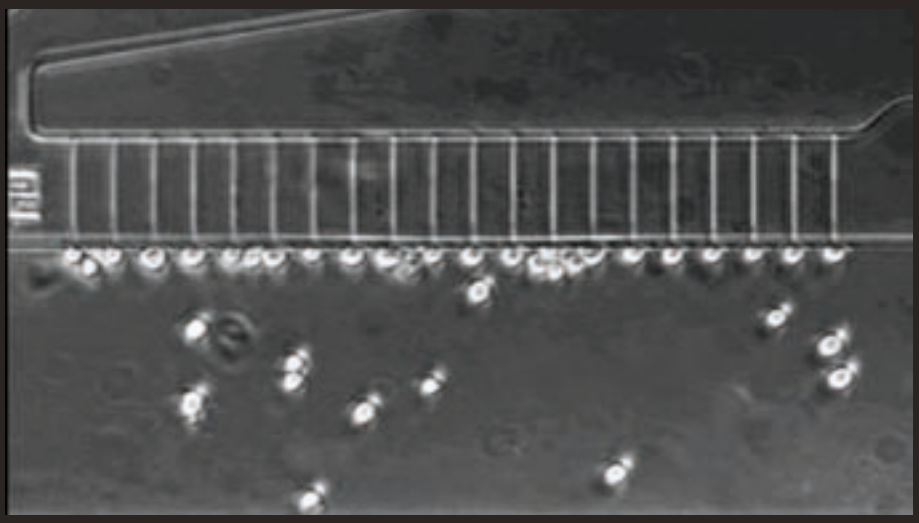
handling arm for plate formatting, a robotic manipulator arm to load and unload plates from the IonFlux instruments, and hotels for microfluidics plate storage. In addition, there are various optional modules to enhance automated cell manipulation, including a microplate centrifuge below the deck of the workstation. For customers requiring very high throughput, up to four IonFlux systems can be integrated onto a single Freedom EVO 100 platform – two at the front and two at the rear – with an 8-channel liquid handling arm providing high speed plate formatting."

"As well as the broad flexibility and extensive integration options offered by the Freedom EVO systems, we chose to work with Tecan because of the Company's reputation for quality and reliability. This gives our customers a high level of confidence in the laboratory automation platforms we recommend, as well as helping to maintain high levels of performance for our IonFlux systems, through consistent and reproducible plate preparation and formatting. Tecan's application specialists have an in-depth knowledge of customers' needs, and this has been an important aspect of our very successful collaboration to develop this integrated solution for high throughput electrophysiology."

To learn more about Fluxion Biosciences, visit **www.fluxionbio.com**

To find out more on Tecan's Freedom EVO workstations, visit **www.tecan.com/freedomevo**

IonFlux system for high throughput electrophysiology. The IonFlux system is designed to operate much like a plate reader. Plates are preloaded with cells, compounds, and reagents using the Freedom EVO platform. Once filled, plates are fed automatically into the instrument. All fluidic control necessary to trap cells and deliver compounds is handled within the instrument and integrated electrodes record ion channel currents.



Microfluidic device for cellular electrophysiological recordings. Ion-channel expressing cells move through a main flow channel, then get trapped at the junction of smaller fluidic channels under negative pressure. Electrodes in contact with the intra- and extra-cellular space of the cells provide a voltage across the cell membrane. Ion channel activity is measured in the form of ionic current going through the membrane-bound ion channels.