AXION BIOSYSTEMS

axioGENESIS

LUMOS MEA 48

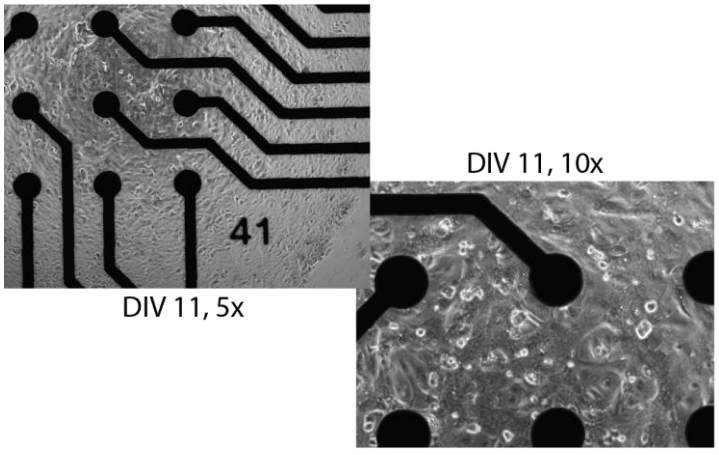
HIGH THROUGHPUT OPTICAL CONTROL

Advantages of optical stimulation

Optogenetics enables the expression of light-sensitive channels for light-induced control of cellular function. Optogenetics is a powerful and versatile research tool. However, in vitro applications have been limited by low throughput light stimulation devices with rudimentary controls. The Lumos, introduced in 2016, provides flexible, powerful light delivery for in vitro applications at a multiwell high throughput scale. The Lumos allows for independent and simultaneous activation of 192 LEDs across 48 wells with user-defined control over wavelength, intensity, and microsecond duration.

Lumos MEA 48

Axion BioSystems' Lumos MEA 48 plates combine high-quality MEA results with highly optimized optical performance. The custom-formulated plate walls provide high reflectance to maximize light delivery to your culture and minimize well-to-well crosstalk. The custom-molded lid mates to the Lumos array and contains integrated optical lenses. Finally, the transparent bottom allows for cell visualization and assay multiplexing with fluorescence, luminescence, and other reporter-based assays.



Phase contrast images of Cor.4U human stem cell derived cardiomyocytes at DIV11 5x and 10x magnification.

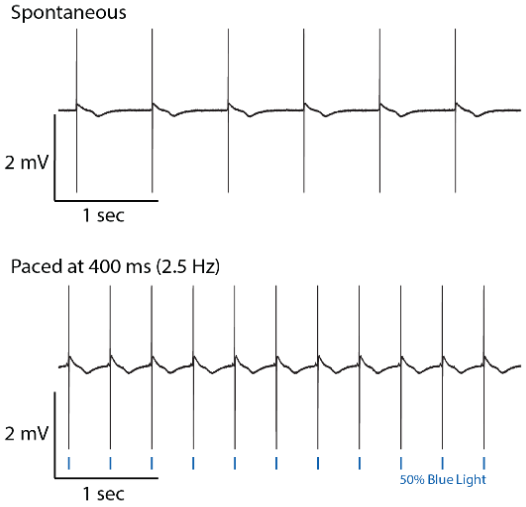
Lumos™ MEA 48 plate (M768-tMEA-48OPT). The bottom of the well is transparent for cell visualization. (Inset) Schematic of single well illustrating 16 electrodes arranged in a 4x4 grid (blue) with surrounding grounds (orange).

THE LUMOS ADVANTAGE

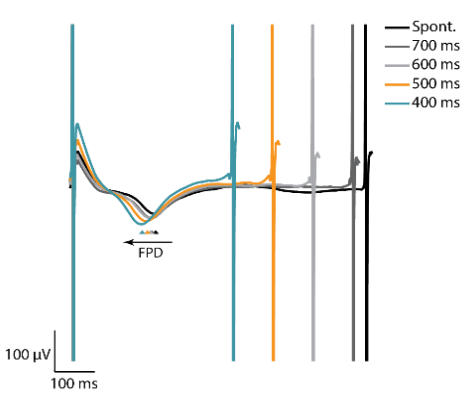
- High throughput, multiwell format
- Customized plate material and lid optics for optimal light delivery and even light dispersion
- Transparent bottom for culture monitoring with light microscopy and assay multiplexing with fluorescence, luminescence, or other reporters
- Independent control of light wavelength, intensity, and duration for each of 48 wells

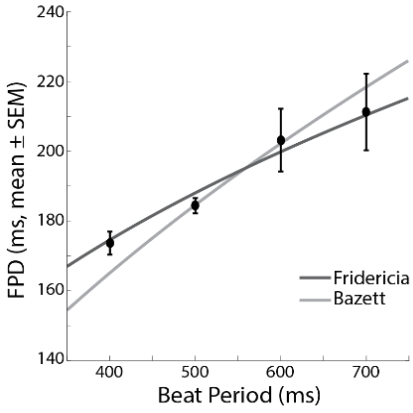
IMPROVE THE QUALITY AND CONSISTENCY OF YOUR ASSAY

Addition of excitatory light-sensitive opsins, such as channelrhodopsin (ChR2), allows for controlled pacing of cardiomyocyte beating or neural network bursting. For cardiomyocytes, pacing the beat rate allows the user to increase physiological relevance, reduce well-to-well variability, and explore use-dependent drug effects.



ChR2 was introduced transiently via Xpress.4U transfection, enabling light-evoked pacing of Cor.4U CMs.

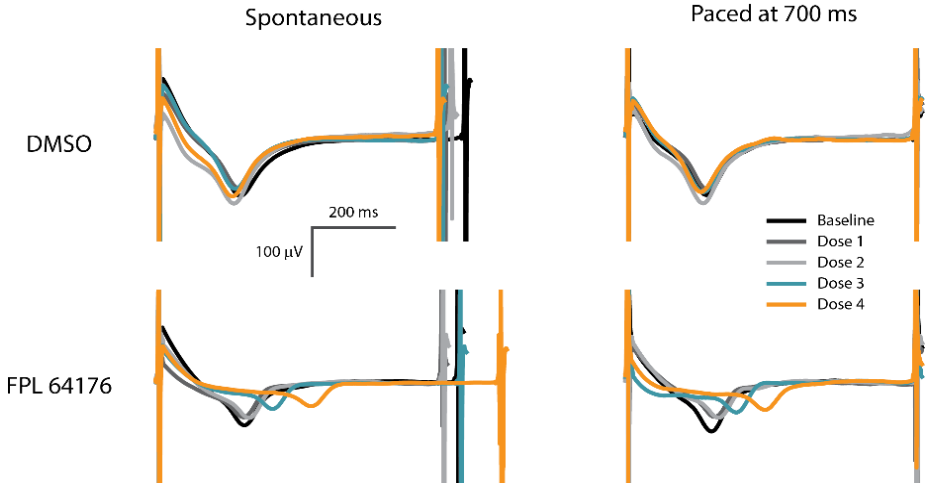




Pacing at multiple rates revealed a rate-dependent change in the field potential duration (FPD) of the Cor.4U CMs (left). Quantification of the BP vs. FPD relationship (right) with pacing provides a true rate-correction curve for the CMs.

DISCOVER MORE FROM YOUR ASSAY BY CONTROLLING ACTIVITY

Many compounds simultaneously affect the beat rate and FPD of hiPSC-derived CMs. Optogenetic pacing enables the user to isolate the compound effects on repolarization alone by controlling the beat rate. Thus, pacing with the Lumos MEA plate significantly increases the information content of your assay.



(Left) Application of FPL 64176 induced a significant prolongation of BP and FPD relative to the vehicle control (DMSO). (Right) Pacing at 700 ms BP controls for the influence of beating rate on repolarization. Under paced conditions, FPL-64176 produced a dose-dependent prolongation of FPD that was independent of beat period.