



OCTOBER 30, 2014

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NEW AT NEUROSCIENCE: 512 CHANNELS, BIOPOTENTIAL HEADSTAGES, CINELAB AND MORE

NEUROSCIENCE 2014 – SO MUCH TO SHARE THIS YEAR!



In less than three weeks it all comes together! We spend months preparing the booth, designing materials, building equipment and the staging demonstrations – all for you. This month's newsletter provides a taste of what is in store from new products to the workshop raffle to job openings. Plexon will be in a typical, multi-space, island booth #1823.

WORKSHOP RAFFLE WORTH \$900

Week of: April 27, 2015

Before jumping into all of the great products we will have on display, we want to remind you about our Workshop Raffle! Two lucky researchers will win a FREE registration to the 2015 Annual Neurophysiology and Behavioral Research Workshop worth \$900 each!

The Workshop is limited to 40 attendees, ensuring maximum hands-on experience. Each winner receives three days of intense training, 1-on-1 coaching, robust materials and exercises, a certificate of completion, two \$150.00 gift certificates for the 2016 Workshop, admission to the Welcome Reception, a ticket to the popular social event, breakfast and lunch for all three days, a Plexon T-shirt and a mug.

Raffle contestants are invited to enter during the conference exhibit hours. Upon the close of the exhibition, two names will be drawn and winners will be contacted immediately. Raffle rules will be available at the booth. Good Luck!

IT'S HERE - 512 NEURAL CHANNELS WITH DHP SUBSYSTEM

The OmniPlex® D Neural Data Acquisition System was launched with the DigiAmp™ subsystem comprised of a digitizing amplifier (either the DigiAmp or MiniDigi™) combined with a choice of analog headstages. In addition to many recording and sorting benefits, researchers can record up to 256 channels of Plexon-quality neural recording.

Plexon now introduces an alternative subsystem enabling an even higher channel count. The newly launched DHP subsystem consisting of the Plexon Digital Headstage Processor (DHP) with new, multiplexing Digital Headstages offer:

- Up to 512 neural recording channels,
- Real-time upsampling to 40KHz and adjustment of multiplexer timing offsets (equivalent to simultaneous sampling) for improved sorting quality, tetrode acquisition, and software referencing - unlike other digital headstage based systems,
- Decreased sensitivity to ambient electrical noise, and
- Lighter headstage cables with fewer wires for greater freedom of animal movement.

With the DHP subsystem, researchers now have access to Plexon quality at very high channel counts with more affordable prices. Stop by the booth for a demonstration of what a 512 channel OmniPlex D System can do!

DON'T MISS NEW BIOPOTENTIAL HEADSTAGES

Plexon is pleased to announce our NEW full differential, Biopotential headstages! We have engineered one specifically for peripheral nerve (PNS) recordings and a second one for electromyography (EMG), electroencephalography (EEG) or electrocardiogram (ECG/EKG) recordings. Both are eight channels, DC coupled, low noise headstages that utilize Gecko connectors, measure 1.4 x 0.9 x 0.2 inches and weigh 0.127 ounces.

The PNS biopotential headstage has noise less than 0.5 μ Vrms, a two pole high pass filter at 120Hz and a one pole low pass filter at 12kHz. It also has a gain of 50x. Alternatively, the EDIF biopotential headstage offers a one pole high pass filter at 0.2Hz, a one pole low pass filter at 2kHz and a 10x gain.

More information can be found on the website, in the *Headstage Datasheet* or in the *Headstage Technical Guide*.

HELLO CINELAB™ BEHAVIORAL RESEARCH SYSTEMS!

Many of you have become familiar with the Plexon's sophisticated, digital video recording and behavior tracking program called the CinePlex® Behavioral Research System. In addition to its flexibility and versatility, it is best known for its seamless synchronization with all of Plexon's neural recording (OmniPlex D, OmniPlex and MAP) systems.

Over the past year, Plexon has taken a new look at how to better serve behavior research labs. As a result, we have expanded well beyond the CinePlex System that serves electrophysiology needs so well into several new recording and analysis products serving research that does not involve electrophysiology.

The new series of products - including but not limited to the CineCorder™, CineTracker™ and CineLyzer™ Systems – combined with the CinePlex System will now be parts of the CineLAB™ Behavioral Research Systems product line. All products within the product line will be specifically designed and implemented for research conditions within a laboratory setting.

Plexon is excited to embark on this new direction. We are eager to unveil the new products ready for launch at Neuroscience, and invite you to join us in defining how the products will evolve in the years to come.

INTRODUCING CINELAB SYSTEMS FOR NON-EPHYS LABS

Plexon is thrilled to announce the launch of a new series of digital video tracking and behavioral analysis products for behavior labs that do not require integrated timing with electrophysiology equipment (part of the CineLAB Behavior Research Systems product line described above)!

These new behavioral products offer more economical camera options, the ability to run and organize data for multiple trials within an experiment, more customization regarding data descriptors and labels, extended arena and zone operations, expanded visualization options and much more.

Introducing the new packages:

- The CineCorder System – ideal for labs only requiring the ability to record animal activity over a continuous or segmented period of time, during daylight or under near-IR conditions, and with research protocols requiring either individual or social interaction settings.
- The CineTracker System – all that CineCorder has to offer plus the ability to perform tracking via two methods: whole body (contour) and colored marker. Researchers will also be able to define an arena and generate an expanded output file containing valuable coordinate data.
- The CineLyzer System - all that CineTracker has to offer plus expanded arena options, the ability to define zones and sequences, user-defined behavioral events, enhanced color marker tracking, many tracked actions and positions such as speed and head direction, a library of pre-defined calculations and 24 digital outputs.

The new CineLAB Systems for non-electrophysiology research provide Plexon-quality in easy-to-use, user-selectable packages accompanied by very attractive pricing. Stop by the booth and let us show you what else the various CineLab Systems can do!

INTEGRATED PLEXON SYSTEMS & LAFAYETTE CHAMBERS

Earlier this year, Plexon and Lafayette Instrument Co. announced plans to integrate our products into a variety of Lafayette's operant and other chambers. The interest has been exciting! To build on that enthusiasm, we will showcase a fully operational, multi-system, integrated set-up! The components to be demonstrated include:

- Lafayette Modular Test Chamber for Rats
- Lafayette Modular Wall Extension with Overhead Commutator Mounting
- Lafayette ABET Mini I/O Module Connection Block
- Lafayette Peristaltic Pump for Liquid Reward
- Lafayette 45mg Pellet Dispenser for Modular Chambers
- Lafayette Liquid/Pellet Trough for Modular Chamber with Head Entry
- Plexon CineLyzer Behavior Analysis System with a color, USB camera
- Plexon PlexBright® 4 Channel Optogenetic Controller with Radiant 2.0
- Plexon PlexBright Dual LED Commutator
- Plexon PlexBright Compact LED Modules
- Plexon PlexBright Optical Patch Cables with LC Ferrule stimulation tips

The setup is even complete with a conference-friendly HexBug to demonstrate the systems in action!

You will have a chance to observe how when an animal crosses specified zones or sequence of zones generating a defined event, CineLyser sends a TTL signal(s) to either the 4 Channel Optogenetic Controller initiating the specified stimulation pattern or a reward dispenser. This particular list of components within the chamber itself allows for the user to provide liquid or pellet reward to the rat via the reward trough. Small LED lights inside the trough can be illuminated to alert the animals of the reward.

The system as displayed may be expanded to incorporate neural recording and other modular components such as a lever, stimulus lights, nose pokes, tone generators and more can be added for more complex behavioral testing.

Stop by and ask us how we can organize an integrated system for your research.

NEUROEXPLORER® 5.0 UP AND RUNNING

NeuroExplorer® is truly the standard in neurophysiology data analysis with nearly 2,000 scientific publications citing its use. After seven years in the making, NeuroExplorer 5.0 was launched a few months ago with a wealth of new functionality (detailed on the webpage). If you have not had an opportunity to click on the demo, we will have it up and running at the booth.

With researchers requesting more than 500 seats already, you do not want to be the last lab using outdated analysis software!

PLEXBRIGHT IS ON FIRE!

If you have not ordered some configuration of the PlexBright Optogenetic Stimulation System, you are amongst a very small population . . . or at least it seems by how the orders have been stacking up! The PlexBright System workstation was the busiest counter in the booth at the last Neuroscience conference, so this year we are ready for you! We have doubled the PlexBright workstations for faster and easier access to the products and demonstrations.

If you are short on time at the PlexBright counter, make sure you at least see the PlexBright 4 Channel Optogenetic Controller with Radiant 2.0 stimulation pattern generation demo, as well as the PlexBright Dual LED + 16 Channels Commutator for simultaneous optogenetic stimulation and neural recording. Lastly, don't miss the fully operational, multi-system set-up demonstrating a Lafayette operant chamber integrated with the PlexBright System and the CineLyzer Behavior Research System.

PROBES AND ELECTRODES

Our specialty probe business is as strong as ever – possibly because we offer some of the most dependable and unique probes available today. Stop by the booth to learn about some of the options including:

- V-Probes – our second generation U-Probe featuring a conical-shaped tip for both ease of penetration and reduction of trauma to the brain upon entry.
- U-Probes – our original, very popular, robust, multi-use, multi-site linear electrode most often used for acute studies with primates. Available in single, stereotrode and tetrode configurations.
- Thumbtack Probe – our chronic, linear probe effective for both field potential and single unit recordings most often used with primates.
- Brain Slice Probe – A multi-site linear electrode array designed to capture neural activity from tissue slices.

Click here to explore more about our available probes and electrodes, or simply stop by and check them out.

DID YOU KNOW . . . HOW TO MAKE THE MOST OF REFERENCE ELECTRODES?

Plexon headstages through the OmniPlex Software permit selection of either a distinct reference electrode or a buffered ground signal as the reference input into the front-end analog amplifier boxes (analog amplifier, DigiAmp, MiniDigi) or into a DHP digital headstage. Practically all Plexon headstages include a buffered reference electrode input pin in addition to the buffered ground pin. If a separate reference electrode is available on a chronic electrode assembly then it will usually provide better artifact rejection than just the ground wire.

Many microwire arrays and bundles are made, or can be made, with a separate reference wire. Since you do not want to pick up units on a reference wire it should be de-insulated for a half to a couple of millimeters. Even a totally bare electrode wire connected to the reference input is better than just the traditional heavier and longer ground wire. Silicon probes and arrays also often include a separate reference electrode.

Check the electrode connection wiring to make sure a reference electrode is use being used if it exists. And, as always, the best results are achieved with the electrode assembly ground wire embedded into the brain at some point.

For more information about reference electrodes and using them with Plexon headstages or any OmniPlex System, contact support@plexon.com.

PLEXON WORKSHOP ALUMNI SPEAK OUT: DANIEL CHEW

"The 2014 Plexon workshop has been a great experience. A truly professionally organised event, that mixes a great series of lectures with intense practical training of the hardware and software. Entering the course as a novice, and in just under 3 days, I have gained a high level of knowledge of Plexon hardware for recording, stimulating (both electrical and optical), behavioural analysis, and offline spike analysis software. I would recommend this event to any in vivo neuroscientist working in academia or industry. A great thanks again to the Plexon organisers!"

Daniel Chew, PhD

GlaxoSmithKline Medicines Research Centre, UK

PLEXON IS HIRING AGAIN!

Come talk to us at Neuroscience about working with Plexon. We are growing again and are seeking outstanding, neuroscience-loving candidates for the following roles:

- Sales Engineer for Electrophysiology
- Sales Engineer for Behavioral Neuroscience
- Support Engineer for Neuroscience
- Senior Windows Software Engineer
- Technician for Neuroscience Manufacturing

In addition to our standard onsite team, we will have the lead from the human resources department in our booth on Monday, Nov. 17, to start the process. If you are interested, let us know you are coming and send your resume to jobs@plexon.com.

NOBEL PRIZE GOES TO NEUROSCIENTISTS!

What an exciting time for the neuroscience community when a few of our own are recognized on the world stage in such a glorious capacity. The entire team at Plexon wishes to congratulate John O'Keefe, May-Britt Moser and Edvard I. Moser on winning the 2014 Nobel Prize in Physiology or Medicine. This most prestigious award was bestowed on the recipients "for their discoveries of cells that constitute a positioning system in the brain". The recipients each received a portion of the ~\$1.1 million prize money.

LASKER AWARD WON BY NEUROSCIENCE RESEARCHERS & CLINICIANS

The celebration does not stop with the Nobel Prize, but continues with the Lasker Awards, the most prestigious and coveted awards presented in the USA for biomedical research. Last month neuroscience researchers and clinicians, Alim-Louis Benabid and Mahlon DeLong, won the 2014 Lasker-DeBaakey Clinical Medical Research Award for the development of deep brain stimulation of the subthalamic nucleus, a surgical technique that reduces tremors and restores motor function in patients with advanced Parkinson's disease. Congratulations from your friends at Plexon!

HARVEY TO ADDRESS STUDENTS IN HOUSTON

Plexon President and Founder, Harvey Wiggins, Jr., will discuss "The Stimulating Business of Neuroscience" next week on Nov. 6 at the University of Houston. The audience will be filled with students of the Cullen College of Engineering's Department of Biomedical Engineering led by the John S. Dunn Endowed Chair Professor, Metin Akay, PhD.

½ PRICED WORKSHOP REGISTRATIONS

When you purchase a PlexBright System with a 4 Channel Optogenetic Controller, any OmniPlex System or any CineLAB System, you are eligible for unlimited half priced Workshop registrations for the upcoming Plexon Workshop. Ask your sales engineer or email workshop@plexon.com with any questions.

PLEXON CLOSED FOR THANKSGIVING HOLIDAY

In observation of Thanksgiving, Plexon's world headquarters will be closed November 27 - 28, with standard operations resuming on Monday, December 1st. Plexon Europe will remain open.

RESEARCH SPOTLIGHT

Let us know about your 2014 publication citing Plexon and our equipment and we will send you a thank you award with a mug and a T-shirt! Send notices, address and T-shirt size to publications@plexon.com

All articles listed are alphabetical based on first author within two categories: articles published online in electronic-only journals or ahead of print, and articles published in full print.

Recent articles published online in electronic-only journals or ahead of print:

- Christian, Edward Philip, Dean H. Snyder, Wei Song, David A. Gurley, Joanne Smolka, Donna L. Maier, Min Ding et al. "EEG β /v Spectral Power Elevation in Rat: A Translatable Biomarker Elicited by GABAA α 2/3 Positive Allosteric Modulators at Non-sedating Anxiolytic Doses." *Journal of Neurophysiology* (2014): jn-00539.
- dos Santos Lima, G. Z., B. Lobão-Soares, G. C. do Nascimento, Arthur SC França, L. Muratori, S. Ribeiro, and G. Corso. "Mouse Activity across Time Scales: Fractal Scenarios." *PLOS ONE* 9, no. 10 (2014): e105092.
- França, Arthur SC, George C. Nascimento, Vítor Lopes-dos-Santos, Larissa Muratori, Sidarta Ribeiro, Bruno Lobão-Soares, and Adriano BL Tort. "Beta2 oscillations (23–30 Hz) in the mouse hippocampus during novel object recognition." *European Journal of Neuroscience* (2014).
- Gullo, Francesca, Alida Amadeo, Giulia Donvito, Marzia Lecchi, Barbara Costa, Andrew Constanti, and Enzo Wanke. "Atypical "seizure-like" activity in cortical reverberating networks in-vitro can be caused by LPS-induced inflammation: a multi-electrode array study from a hundred neurons." *Frontiers in Cellular Neuroscience* 8 (2014): 361.
- He, Ling-jie, Nan Liu, Tian-lin Cheng, Xiao-jing Chen, Yi-ding Li, You-sheng Shu, Zi-long Qiu, and Xiao-hui Zhang. "Conditional deletion of *Mecp2* in parvalbumin-expressing GABAergic cells results in the absence of critical period plasticity." *Nature Communications* 5 (2014).
- Kadohisa, Mikiko, Makoto Kusunoki, Philippe Petrov, Natasha Sigala, Mark J. Buckley, David Gaffan, and John Duncan. "Spatial and temporal distribution of visual information coding in lateral prefrontal cortex." *European Journal of Neuroscience* (2014).
- Kumbhare, Deepak, and Mark S. Baron. "A novel tri-component scheme for classifying neuronal discharge patterns." *Journal of Neuroscience Methods* (2014).
- Laxpati, Nealen G., Babak Mahmoudi, Claire-Anne Gutekunst, Jonathan P. Newman, Riley Zeller-Townson, and Robert E. Gross. "Real-time in vivo Optogenetic Neuromodulation and Multielectrode Electrophysiologic Recording with NeuroRighter 2." *Frontiers: Neuroengineering* 28, no. 29 (2014): 30.
- Lu, Hanbing, Leiming Wang, William W. Rea, Julia K. Brynildsen, Saul Jaime, Yantao Zuo, Elliot A. Stein, and Yihong Yang. "Low-but Not High-Frequency LFP Correlates with Spontaneous BOLD Fluctuations in Rat Whisker Barrel Cortex." *Cerebral Cortex* (2014): bhu248.
- Nakamura, Hiroko, Risako Kato, Tetsuo Shirakawa, Noriaki Koshikawa, and Masayuki Kobayashi. "Spatiotemporal profiles of dental pulp nociception in rat cerebral cortex: An optical imaging study." *Journal of Comparative Neurology* (2014).
- Ruff, Douglas A., and Marlene R. Cohen. "Attention can either increase or decrease spike count correlations in visual cortex." *Nature Neuroscience* (2014).
- Silva, Ana C., Glyn A. McMillan, Cristina P. Santos, and John R. Gray. "Background complexity affects the response of a looming-sensitive neuron to object motion." *Journal of Neurophysiology* (2014): jn-00478.
- Sullivan, Elyse M., Patricia Timi, L. Elliot Hong, and Patricio O'Donnell. "Reverse Translation of Clinical Electrophysiological Biomarkers in Behaving Rodents under Acute and Chronic NMDA Receptor Antagonism." *Neuropsychopharmacology* (2014).
- Wittstock, Matthias, Paulus S. Rommer, Florian Schiffmann, Konstantin Jügelt, Simone Stüwe, Reiner Benecke, Dietmar Schiffmann, and Uwe K. Zettl. "Effect of methylprednisolone on mammalian neuronal networks in vitro." *Cellular and Molecular Neurobiology* (2014): 1-4.
- Womelsdorf, Thilo, Salva Ardid, Stefan Everling, and Taufik A. Valiante. "Burst Firing Synchronizes Prefrontal and Anterior Cingulate Cortex during Attentional Control." *Current Biology* (2014).
- Xu, Kedi, Yi Qu, Kang Lin, Xiaoxiang Zheng, and Yueming Wang. "A BMI-based flashing light recognition system on free-moving rats." In *Information Science and Technology (ICIST), 4th IEEE International Conference*, pp. 640-643. IEEE, 2014

Recent articles published in full print:

- Diehl, Maria M., and Lizabeth M. Romanski. "Responses of Prefrontal Multisensory Neurons to Mismatching Faces and Vocalizations." *The Journal of Neuroscience* 34, no. 34 (2014): 11233-11243.
- Kalwani, Rishi M., Siddhartha Joshi, and Joshua I. Gold. "Phasic Activation of Individual Neurons in the Locus Ceruleus/Subceruleus Complex of Monkeys Reflects Rewarded Decisions to Go But Not Stop." *The Journal of Neuroscience* 34, no. 41 (2014): 13656-13669.
- Li, Ling-yun, Xu-ying Ji, Feixue Liang, Ya-tang Li, Zhongju Xiao, Huizhong W. Tao, and Li I. Zhang. "A Feedforward Inhibitory Circuit Mediates Lateral Refinement of Sensory Representation in Upper Layer 2/3 of Mouse Primary Auditory Cortex." *The Journal of Neuroscience* 34, no. 41 (2014): 13670-13683.
- Lima, Bruss, Mariana MB Cardoso, Yevgeniy B. Sirotnin, and Aniruddha Das. "Stimulus-Related Neuroimaging in Task-Engaged Subjects Is Best Predicted by Concurrent Spiking." *The Journal of Neuroscience* 34, no. 42 (2014): 13878-13891.
- Peck, Christopher J., and C. Daniel Salzman. "The Amygdala and Basal Forebrain as a Pathway for Motivationally Guided Attention." *The Journal of Neuroscience* 34, no. 41 (2014): 13757-13767.