

CFE-2 5 μ m Carbon Fiber Electrodes

Cyclic voltammetry and amperometry are indispensable techniques for the study of neurotransmitter release. They can be used to identify neurotransmitters or to determine the kinetics of release from single vesicles.

Selection of electrodes is critical for effective use of this technique. Constructing your own is tedious and demanding. ALA's parylene coated CFE electrodes offer the following advantages:

- * 5 μ m OD carbon fibers suitable for recording from small cells
- * Electrode holders for all major commercial amplifiers ensures stable connection
- * Dielectric properties of coating enable low-noise recording
- * Tips easily re-cut for multiple re-uses
- * Electrodes shaped to fit under water-immersion objectives
- * Proven performance in numerous widely-cited studies



Axon universal holder type

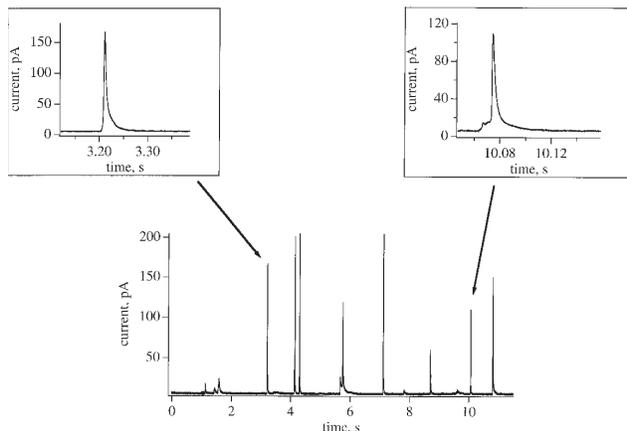


CFE-2 actual size: 60mm x 2mm

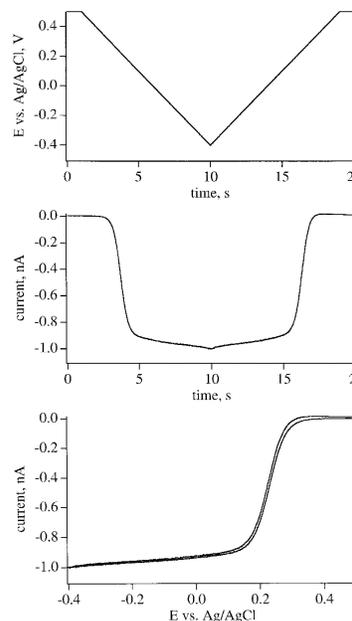


BNC holder type

Amperometric events at high resolution; the right figure shows a prespike ("foot") feature, due to escape of transmitter out of an early, not fully expanded fusion pore.



Amperometric recording of adrenaline release from an isolated bovine chromaffin cell. Detection of amperometric spikes, the quantal responses due to single-vesicle exocytosis, was performed with an EDP insulated 5 μ m OD CFE-1 held at +800mV vs Ag/AgCl.



Cyclic voltammogram (CV) for the reduction of 1mM ferricyanide measured at a parylene coated 5 μ m OD CFE-2. (Scan rate 100mV/s; electrolyte: 0.5M KCl @ pH 3)

Select References:

Chih-Tien Wang, Jihong Bai, Payne Y. Chang, Edwin R. Chapman and Meyer B. Jackson, *Synaptotagmin-Ca²⁺ triggers two sequential steps in regulated exocytosis in rat PC12 cells: fusion pore opening and fusion pore dilation*, J Physiol 570.2 (2006) pp 295-307

Liang-Wei Gong, Gilbert Di Paolo, Ester Diaz, Gianluca Cestra, Maria-Elena Diaz, Manfred Lindau, Pietro De Camilli, and Derek Toomre, *Phosphatidylinositol phosphate kinase type I regulates dynamics of large dense-core vesicle fusion*, PNAS April 5, 2005, vol. 102, no. 14, 5204-5209

Xue Han, Chih-Tien Wang, Jihong Bai, Edwin R. Chapman, and Meyer B. Jackson, *Transmembrane Segments of Syntaxin Line the Fusion Pore of Ca²⁺-Triggered Exocytosis*, Science Vol. 304, 289-292, 9 April 2004

A. Schulte and R. Chow, *A simple method for insulating carbon-fiber microelectrodes using anodic electrophoretic deposition of paint*, Analytical Chemistry 1996, 68, 3054-3058

Ordering Information:

ALA CFE-2	Carbon Fiber Electrodes - pack of 10 - 5 μ m OD fibers
ALA CFE-H-AXU	CFE Electrode Holder for Axon Universal Amplifiers
ALA CFE-H-BNC	CFE Electrode Holder for EPC/BNC Amplifiers (e.g. EPC-10)

VA-10 Voltammeter / Amperometer

Voltammetry and amperometry are powerful, sensitive techniques for the study of the release of oxidizable transmitters from cells or single vesicles. Patch clamp amplifiers that perform these techniques include many expensive features that are not required.

npi electronic's **VA-10X** series amplifiers offers all of the essential features in a compact and inexpensive unit.

VA-10X Features:

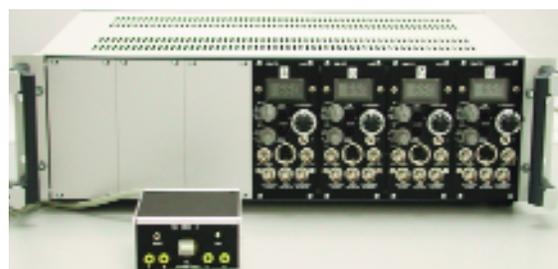
- * Two or three electrode headstage for floating command potential
- * Standard current range: $\pm 20\text{nA}$ with $500\text{M}\Omega$ feedback resistor
 - feedback resistors from $1\text{M}\Omega$ to $10\text{G}\Omega$ available
- * Frequency booster for signals up to several kHz
- * Low noise electronics for recording release of single vesicles
- * Seven (**VA-10X**) or six (**VA-10M**) gain settings to record signals of varying amplitudes
- * Sixteen (**VA-10X**) or six (**VA-10M**) step low-pass Bessel filter (4-pole or 8-pole)
- * Command potential set internally (ten-turn control) or externally
- * Two current outputs (filtered and unfiltered)
- * Telegraph outputs (gain, filter, command) for easy interfacing to data acquisition systems
- * Digital meter for command potential



VA-10X 19" rack mounted standalone amplifier



VA-10M module



EPMS rack housing w/4 VA-10M modules and single headstage

Ref: Dias et al.
Nanotechnology,
13,285-289

VA-10X Ordering information

npi VA-10X-4	Voltammeter / Amperometer Amplifier with 4 pole Bessel low pass filter - 19" Rack Mount
npi VA-10X-8	Voltammeter / Amperometer Amplifier with 8 pole Bessel low pass filter - 19" Rack Mount
npi EPMS-7	19" Rack Mount Chassis - Holds up to 7 modules w/power supply
npi VA-10-M	Voltammeter / Amperometer module for EPMS system
npi VA-10FB	Frequency booster for VA-10X system

For complete VA-10X specifications go to ALA's web site or www.npielectronic.com