NEUROBIONICS

IO Fiber

Multifunctional Neural Probe

RESEARCH PRODUCT DATASHEET

For research use only. Not for use in diagnostic or therapeutic procedures.

IO Fiber is an integrated, multifunctional neural probe that enables optogenetic stimulation, fiber photometry recording, electrophysiology recording, electrical stimulation, and localized drug or gene delivery — all from a single, flexible, minimally invasive implant. It combines a polymer optical waveguide, six tungsten or carbon microelectrodes, and a microfluidic channel in one compact device, fabricated via a patented thermal drawing process adapted from the textile and telecommunications industries.

KEY FEATURES

- **Five modalities, one probe:** simultaneously perform optogenetic stimulation, fiber photometry, electrophysiology, electrical stimulation, and local drug or gene delivery at the same site.
- **“One-step optogenetics / photometry”:** the integrated microfluidic channel enables viral vector delivery (AAVs encoding opsins or reporters) directly at the probe tip during implantation to ensure gene expression is co-localized with your optical waveguide tip.
- **Compact & lightweight:** suited to freely behaving rodent studies and adaptable to larger animal models.
- **Versatile configurations:** opto-electro-fluidic, opto-electric, and opto-fluidic variants available.
- **Large-animal probes available:** multimodal experiments in deep brain regions of NHPs and other large-animal models. Contact us to discuss NHP and large-animal configurations.

SPECIFICATIONS

Probe dimensions	310 µm × 280 µm × custom L	**Weight (all configurations)**	1.4 g
Optical waveguide ∅	200 µm	**Waveguide material**	Polymer
Numerical aperture (NA)	0.65	**Electrode count**	6
Electrode diameter	20 µm	**Electrode material**	Tungsten or CNT (carbon nanotube)
Microfluidic channel	100 µm × 40 µm	**Fluidic dead volume**	0.51 µL
Optical loss coefficient	0.34 ± 0.095 dB/cm	**Electrode impedance (at 1 kHz)**	10.7 ± 3.5 kΩ
Infusion flow rate (validated)	25–75 nL/min (1:1 pump to output)	**Shank / implant length**	Customized to your need

CONFIGURATION COMPARISON

SPECIFICATION	OEF Opto-Electro-Fluidic	OE Opto-Electric	OF Opto-Fluidic
Optical waveguide ∅	200 µm	200 µm	200 µm
Numerical aperture	N.A. 0.65	N.A. 0.65	N.A. 0.65
Optical connector	∅1.25 mm × 6.4 mm Ceramic Ferrule ∅1.25 mm × 6.4 mm Stainless Steel Ferrule ∅2.5 mm × 10.5 mm Ceramic Ferrule ∅2.5 mm × 12.7 mm Stainless Steel Ferrule	∅1.25 mm × 6.4 mm Ceramic Ferrule ∅1.25 mm × 6.4 mm Stainless Steel Ferrule ∅2.5 mm × 10.5 mm Ceramic Ferrule ∅2.5 mm × 12.7 mm Stainless Steel Ferrule	∅1.25 mm × 6.4 mm Ceramic Ferrule ∅1.25 mm × 6.4 mm Stainless Steel Ferrule ∅2.5 mm × 10.5 mm Ceramic Ferrule ∅2.5 mm × 12.7 mm Stainless Steel Ferrule
Electrode count	6	6	—
Electrode size / material	20 µm · W or CNT	20 µm · W or CNT	—
Electrical connector	Omnetics (A79042-001 or A79018-001)	Omnetics (A79042-001 or A79018-001)	—
Microfluidic channel	100 µm × 40 µm	—	100 µm × 40 µm
Fluidic connector	PEEK 1/16″ × 0.010″	—	PEEK 1/16″ × 0.010″
Probe dimensions	310 µm × 280 µm × custom	310 µm × 280 µm × custom	310 µm × 280 µm × custom
Weight	1.4 g †	1.4 g †	1.4 g †

† Typical value; dominated by connector mass and therefore varies by configuration.

CONNECTOR OPTIONS

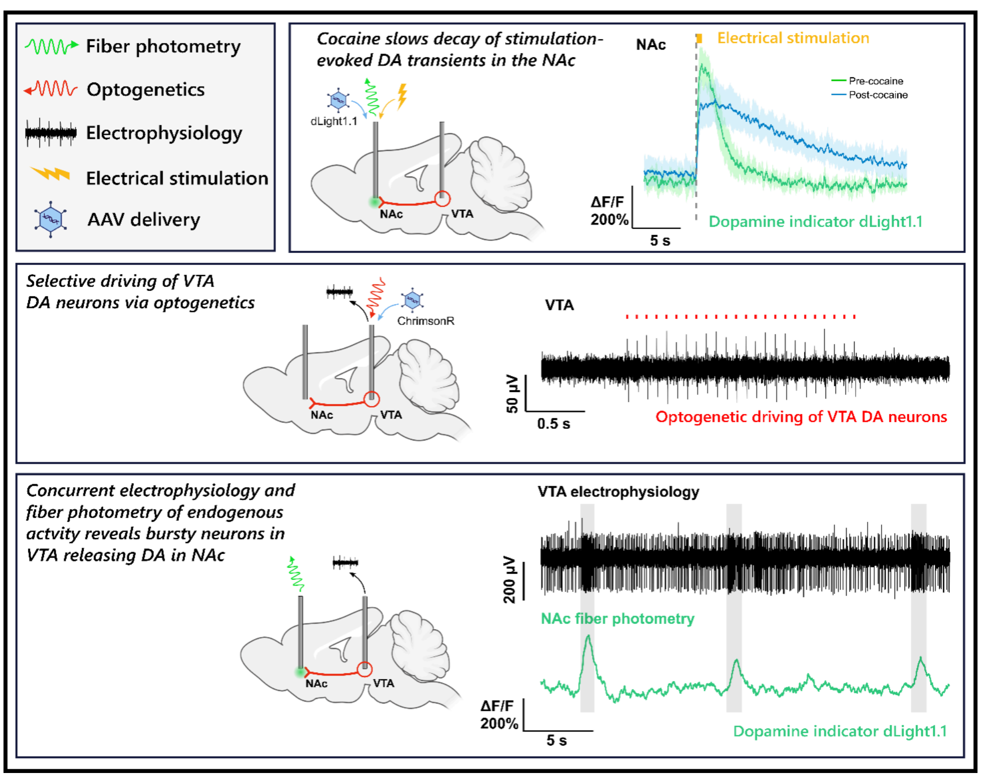
Optical: ∅2.5 mm ferrule (12.7 mm stainless steel / 10.5 mm ceramic) or ∅1.25 mm ferrule (6.4 mm stainless steel / ceramic). Stainless steel is recommended for fiber photometry to minimize optical loss and autofluorescence.

Fluidic: 1/16″ OD × 0.010″ ID PEEK tubing, compatible with 32G needle (Hamilton recommended); luer-lock inlet option for infusion-pump connection.

Electrical: Omnetics (A79018-001 or A79042-001) for integration with most electrophysiology rigs.

APPLICATION EXAMPLE

Dual IO Fibers implanted in two regions of a single mouse: AAV delivered through microfluidic channel (dLight1.1 dopamine indicator in the nucleus accumbens; Cre-dependent ChrimsonR in VTA dopamine neurons), followed by optogenetics, fiber photometry, and electrophysiology in the same animal — demonstrating multimodal, multi-site experiments from one device.



Reference: *N. Driscoll et al., "Multifunctional Neural Probes Enable Bidirectional Electrical, Optical, and Chemical Recording and Stimulation In Vivo," Adv. Mater. 2024, 2408154. doi:10.1002/adma.202408154*