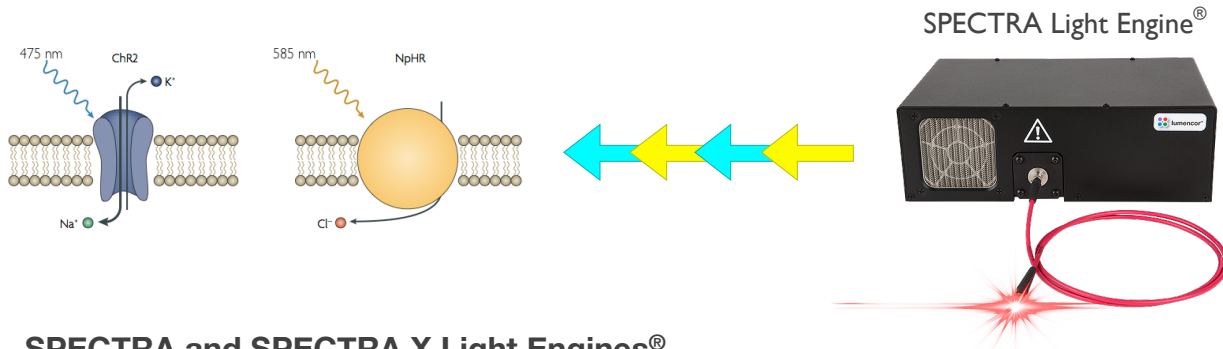


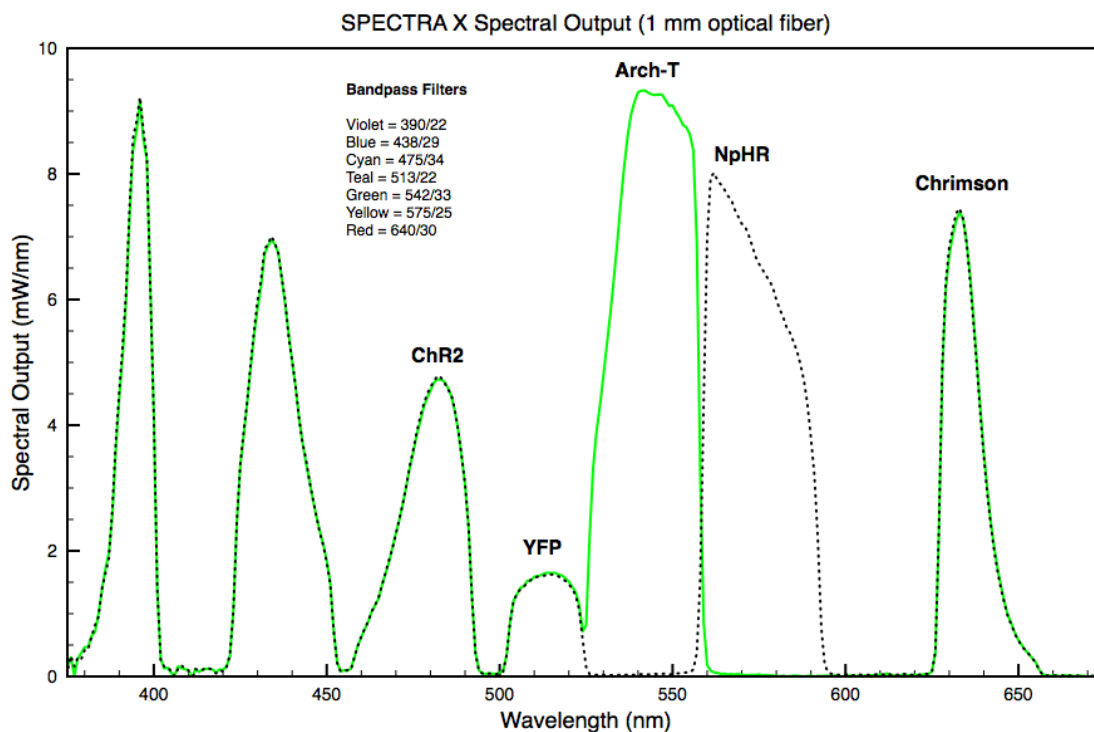
Light Engines for Optogenetics

ILLUMINATION FOR HIGH PRECISION NEUROSTIMULATION



SPECTRA and SPECTRA X Light Engines®

- Up to 6 independently selectable solid-state sources filtered to provide 7 spectral bands
- Source switching times 5–20 μ s, depending on the color band
- Modulation rates up to 5 kHz
- Efficient output coupling into 50–1000 μ m diameter optical fibers
- Intense outputs: 75–150 mW per band (1 mm fiber), 3–6 mW per band (0.2 mm fiber)
- Output power stability and precise output modulation facilitate quantitation
- Optional near-infrared (nIR) source (735 nm)
- Fixed (SPECTRA) or user-exchangeable (SPECTRA X) filter configurations
- TTL interface controls source selection and on/off timing
- Serial interface controls source selection, on/off timing and attenuation (0–100% in 1% steps)



PROVEN PERFORMANCE IN CUTTING EDGE RESEARCH



Applications of Lumencor Light Engines for Optogenetics

Light Engine	Application	Reference	PMID
SPECTRA X	Identification of melanopsin-based responses in photosensitive retinal ganglion cells using alternating blue (438 nm) and yellow (575 nm) stimuli	Melanopsin-derived visual responses under light adapted conditions in the mouse dLGN. PLoS ONE (2015) 10(3):e0123424	25822371
SOLA SE	Transient (~100 ms) stimulation of ChR2 (460–490 nm) in zebrafish hair cells	Optical stimulation of zebrafish hair cells expressing channelrhodopsin-2. PLoS ONE (2014) 9(5): e96641	24791934
SPECTRA X	Activation of ChR2 and NpHR with cyan (475 nm) and yellow (586 nm) light respectively in mouse dorsal root ganglion neurons	Virally mediated optogenetic excitation and inhibition of pain in freely moving nontransgenic mice. Nature Biotech. (2014) 32(3):274–278	24531797
SPECTRA X	Activation (475 nm) and deactivation (632 nm) of bi-stable light-activated chloride channel SwiChR	Structure-guided transformation of channelrhodopsin into a light-activated chloride channel. Science (2014) 344(6182):420–424	24763591
SPECTRA	Stimulation (ChR2, 475 nm) and inhibition (Arch-T, 549 nm) of melanin-concentrating hormone (MCH) producing neurons	Optogenetic manipulation of activity and temporally controlled cell-specific ablation reveal a role for MCH neurons in sleep/wake regulation. J Neurosci. (2014) 34(20):6896–6909	24828644
SPECTRA X	Stimulation of light-activated chloride channel ChloC (476 nm)	Conversion of channelrhodopsin into a light-gated chloride channel. Science (2014) 344(6182):409–412	24674867
SPECTRA	Transient (1–200 ms) stimulation of ChR2 (475 nm) in rat cortical neurons	Role of electrical activity in horizontal axon growth in the developing cortex: a time-lapse study using optogenetic stimulation. PLoS ONE (2013) 8(12):e82954	24376616
SPECTRA	Optogenetic inhibition of Arch-T expressing neurons (542 nm)	Long-lasting silencing of orexin/hypocretin neurons using archaerhodopsin induces slow-wave sleep in mice. Behav Brain Res. (2013) 255:64–74	23707248



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