

# Starstim fNIRS

Combined wearable & wireless  
fNIRS - tDCS - EEG in one  
single headcap



Combine transcranial current stimulation (tCS: tDCS, tACS, tRNS) & electroencephalography (EEG) with fNIRS in one single headcap.



Optimal solution for brain stimulation and imaging.



Includes Neuroelectronics® Starstim (tCS and EEG) & Artinis Brite / OctaMon, both non-invasive and wearable technologies.

## Applications:

The Starstim fNIRS kit allows clinicians and researchers to measure resting-state and task-related cortical activity (EEG) and/or hemodynamics (fNIRS) before, during and after transcranial electrical stimulation in real-world settings.

[www.artinis.com](http://www.artinis.com)

Artinis Medical Systems  
+31 481 350 980  
askforinfo@artinis.com

Starstim fNIRS  
research package

Einsteinweg 17  
6662 PW Elst  
The Netherlands

## Relevant publications

Anwar, A. R. et al. *Effective Connectivity of Cortical Sensorimotor Networks During Finger Movement Tasks: A Simultaneous fNIRS, fMRI, EEG Study.* *Brain Topogr.* 29, 645–660 (2016).

Cabibel, V., Muthalib, M., Teo, W.-P. & Perrey, X. S. *High-definition transcranial direct-current stimulation of the right M1 further facilitates left M1 excitability during crossed facilitation.* *J Neurophysiol* 7

Muthalib, M., Besson, P., Rothwell, J., Ward, T. & Perrey, S. *Effects of Anodal High-Definition Transcranial Direct Current Stimulation on Bilateral Sensorimotor Cortex Activation During Sequential Finger Movements: An fNIRS Study.* in *Oxygen Transport to Tissue XXXVII* (eds. Elwell, C. E., Leung, T. S. & Harrison, D. K.) 876, 351–359 (Springer New York, 2016).

Muthalib, M., Besson, P., Rothwell, J. & Perrey, S. *Focal Hemodynamic Responses in the Stimulated Hemisphere During High-Definition Transcranial Direct Current Stimulation: FOCAL HEMODYNAMIC RESPONSES DURING HD-tDCS.* *Neuromodulation Technol. Neural Interface* 21, 348–354 (2018).

Muthalib, M. et al. *Effects of Increasing Neuromuscular Electrical Stimulation Current Intensity on Cortical Sensorimotor Network Activation: A Time Domain fNIRS Study.* *PLOS ONE* 10, e0131951 (2015).

Teo, W.-P. et al. *Does a Combination of Virtual Reality, Neuromodulation and Neuroimaging Provide a Comprehensive Platform for Neurorehabilitation? – A Narrative Review of the Literature.* *Front. Hum. Neurosci.* 10, (2016).



## Starstim fNIRS package

The Starstim fNIRS kit is the most modern wireless solution for brain stimulation and imaging that combines transcranial current stimulation (tCS: tDCS, tACS, tRNS) with electroencephalography (EEG) and functional near-infrared spectroscopy (fNIRS) neuroimaging in one single headset. The Starstim fNIRS kit includes a Neuroelectronics Starstim (tCS and EEG) and an Artinis OctaMon/Brite (fNIRS) systems, all non-invasive, lightweight, and head-wearable technologies.

In addition to the equipment provided, the Starstim fNIRS kit package includes kick-start training/support by Silverline Research on how to integrate these two state-of-the-art devices (single headcap and software synchronisation) through every step as well as 1-year online support to optimise your experimental design, methods and analysis at no additional cost.

Silverline Research expertise can also provide specialised online and/or on-site training to work more closely with your research team to integrate tCS with neuroimaging (EEG and fNIRS) as well as other neurophysiological techniques (TMS, fMRI) and applications (cognition, motor control, sports and virtual reality) into your experimental design, methods, and analysis.



### NIRS functionality

NUMBER OF CHANNELS	8 or 24 channels
SAMPLING RATE	50 Hz
LIGHT SOURCE	LED (2x wavelengths per transmitter)
WAVELENGTHS	760, 850 nm
OPTODE DISTANCE	30 mm

### EEG functionality

NUMBER OF CHANNELS	8, 20, or 32 channels
SAMPLING RATE	500 Hz
BANDWIDTH	0 to 125Hz (DC coupled)
RESOLUTION	24 bits – 0,05 $\mu$ V resolution
NOISE	< 1 $\mu$ V RMS
CMRR	-115 dB
INPUT IMPEDANCE	1 G $\Omega$

### Stimulation functionality

NUMBER OF CHANNELS	8, 20, or 32 channels
SAMPLING RATE	1000 Hz
FREQUENCY RANGE	0 to 250 Hz (tACS) and 0 to 500 Hz (tRNS)
STIMULATION TYPES	tDCS, tACS and tRNS
MAXIMUM CURRENT PER-CHANNEL	$\pm$ 2mA
CURRENT ACCURACY	1%
CURRENT RESOLUTION	1 $\mu$ A
VOLTAGE	$\pm$ 15 V per electrode (30 V potential difference)

[www.artinis.com](http://www.artinis.com)

NE  
neuroelectronics

artinis



Silverline  
Research

The Starstim fNIRS package is delivered in a plug-and-play package that includes everything you need to start your research.