Materials List for:

A Wireless, Bidirectional Interface for *In Vivo* Recording and Stimulation of Neural Activity in Freely Behaving Rats

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Materials

Name	Company	Catalog Number	Comments
Thomas Wireless System (TWS) version 2.0	Thomas RECORDING GmbH	AN001165	The Thomas Wireless System (TWS) version 2.0 is a portable multichannel telemetry system with laptop computer, a preinstalled Microsoft Windows operating system and TWS control software. The TWS includes: low noise 4 channel pre– and programmable main amplifier with fixed bandwidth, single channel constant–current stimulator for application of biphasic current pulses, software programmable micro stimulator, implantable connector system and a basic head stage unit for mounting to an animal. The system is delivered with a transceiver with USB port connection for laptops or desktop personal computers, the control software running under Microsoft operating system Windows. The TWS system can be used for extracellular neural stimulation and recording in freely behaving small animals (e.g. rats, guinea pigs). This system can be adapted to be used in larger animals (e.g. primates) as well.
Software for Thomas Wireless System (TWS)	Thomas RECORDING GmbH	inlcuded in AN001165	The software for the Thomas wireless system is running under Microsoft Windows operating system and provides the graphical user interface (GUI) for the Thomas Wireless System (TWS). The TWS GUI offers complete control of the TWS functions 4 channel recording and 1 channel stimulation.
Implantable tetrode for recording (4 channels) and stimulation (single channel)	Thomas RECORDING GmbH	AN001132	Implantable tetrode for recording (4 channels) and stimulation (single channel) for use with Thomas Wireless Systems (TWS). Recording tetrode specifications: tetrode fiber material: quartz

			glass insulated platinum tungsten fiber, tetrode fiber outer diameter: 100µm, tip shape D, impedance 0.5-0.8MOHm; Reference electrode: tip shape: D; Impedance: 300-500kOhm; Material: quartzglass insulated platinum/tungsten; Stimulation electrode specification: fiber material: platinum/iridium, diameter: 125µm, lacquer insulated, tip shape : D, impedance: < 10kOhm, dimensions of the electrode can be specified by the end user
Implantable microelectrode for recording (single channel) and stimulation (single channel)	Thomas RECORDING GmbH	AN001118	Implantable microelectrode for recording (single channel) and stimulation (single channel) for use with Thomas Wireless Systems (TWS). Recording electrode specifications: electrode fiber material: quartz glass insulated platinum tungsten fiber, electrode fiber outer diameter: 80µm/250µm (please specify), tip shape D, impedance 0.5-0.8MOHm; Reference electrode: tip shape: D; Impedance. 300-500kOhm; Material: quartzglass insulated platinum/tungsten; Stimulation electrode specification: fiber material: platinum/iridium, diameter: 125µm, lacquer insulated, tip shape : D, impedance: < 10kOhm
Holder for electrode implantation	Thomas RECORDING GmbH	AN000838	Special bent metal rod for microelectrode implantation for standard electrode holders. The rod is used to hold an implantable electrode. The implantable electrode is fixed to the rod with special Thomas RECORDING water soluable glue (AN001080). (Electrode holder is not included)
Replacement accumulator power supply for the Thomas Wireless System (3,7V/230mAh)	Thomas RECORDING GmbH	AN001208	Replacement rechargeable battery (accumulator) for Thomas Wireless System with a capacity of 230mA for approximately 1h operation time. (size: 27mm x 20mm x 6mm, weight app. 6g)
Replacement accumulator power supply for the Thomas Wireless System (3,7V/450mAh)	Thomas RECORDING GmbH	AN001209	Replacement rechargeable battery (accumulator) for Thomas Wireless System with a capacity of 450mA for more than 1h operation time. (size: 48mm x 30mm x 4mm, weight app. 11g)
Accumulator charger for Thomas Wireless System (TWS) rechargable accumulator	Thomas RECORDING GmbH	AN001207	Mains powered charger for the Thomas Wirless System (TWS) rechargable accumulators (AN001209 and AN001209)
Water soluble glue	Thomas RECORDING GmbH	AN001080	Thomas RECORDING water soluble electrode glue is a specially selected product for use with implantable microelectrodes in neuroscientific research. Its

			unique properties ensure a rigid connection between electrode and mounting device although it is easily removable with warm water. The Thomas RECORDING water soluble electrode glue can be used out-of-the-box, without any time consuming preparation. Thomas RECORDING water soluble electrode glue is not harmful to humans, animals or the environment. Quantity: 1 box of 10 gramms
Miniature differential preamplifier	Thomas RECORDING GmbH	AN000329	The Miniature Differential Pre-Amplifier, Model MDPA-2 is a 2-channel, differential input preamplifier that is designed for low noise recordings from excitable tissue. It is intended for extracellular recording in conjunction with the implantation of implantable microelectrodes for freely moving animal appliactions with the Thomas Wireless System (TWS). The 2-Channel Miniature Differential Preamplifier (MDPA-2) is connected to the implantable microelectrodes for providing the initial tenfold amplification stage. Ideally Thomas RECORDING quartz glass insulated platinum/ tungsten electrodes are used to yield optimal recording results with high signal amplitudes and low noise levels. The MDPA-2 has additional common ground and reference electrode inputs.
Connection cable	Thomas RECORDING GmbH	AN000330	Connection cable to connect the Thomas Miniature differential preamplifier (MDPA-2) to a main amplifier and an accumulator power supply.
Rechargeable power supply for the miniature preamplifier	Thomas RECORDING GmbH	AN000328	Rechargeable accumulator power supply for the Miniature differential preamplifier (MDPA-2).
Accumulator charger (US)	Thomas RECORDING GmbH	AN000167	Accumulator charger for the power supply AN000328 (US mains power outlet conenctor)
Accumulator charger (EU)	Thomas RECORDING GmbH	AN000168	Accumulator charger for the power supply AN000328 (EU mains power outlet connector)
Differential preamplifier/main amplifier/bandpass filter	Thomas RECORDING GmbH	AN000677	TREC AC Main Amplifier (LabAmp-03) is a single-channel, differential main amplifier for neurophysiological applications (e.g. extracellular recording with microelectrodes). This Instrument is designed to work with the miniature Differential Pre-Amplifier, Model MDPA-2. The single channel of the LabAmp-03 contains a high-gain, low-noise differential amplifier stage followed by low frequency and high-frequency filters. The amplifier has two different filter amplifiers, a single unit activity

			(SUA) filter –amplifier and a local field potential (LFP) filter amplifier, both are connected parallel in the signal path. Record Mode offers two levels of signal gain (x10, x100) in a first stage and 4 additional levels (x5, x10, x25 and x50) in a final amplifier stage. Each amplifier has different bandpass characteristics for single unit activity (SUA) 500Hz…20kHz and local field potentials (LFP) 0,1Hz…140Hz. An audio monitor and a window discriminator is integrated in the device. The LabAmp-03 has an integrated audio monitor with loudspeaker. This unit provides audio reproduction of electrophysiological signals. The unit combines an audio amplifier in a compact, rugged package. This is especially suited to monitoring neural firing and muscle contractions. The audio monitor input is internally connected to the SUA-Filter amplifier output. The LabAmp-03 is delivered with external power supply for a mains power operation voltage range of 100-240V AC/50-60Hz.
USB Oscilloscope	Thomas RECORDING GmbH	AN001096	USB PC Oszilloskop, 2 Kanal. This 2-channel PC oscilloscope is perfect suitable for mobile use on a laptop and permanent installation in control cabinets, industrial equipment and many other applications where a small, lightweight and powerful oscilloscope is required. This oscilloscope is connected to the signal output of the main amplifier is for display of recorded extracellular activity during the implanation of the implantable microelectrodes for the Thomas Wireless System (TWS). The user can acquire the measurement data over the several data-interfaces directly on the PC with includes PC software.
Stimulus generator	Multichannel Systems	STG3008-FA	Stimulus Generator for Current (STG) and Voltage Driven Stimulation fulfill three functions: current driven stimulation, voltage driven stimulation, controlling and timing. The STG is available with 2, 4 or 8 independet output channels. Featuring integrated isolation units for each output channel, the STG is able to provide any arbitrary waveform.
Cap protector for the electrode	Thomas RECORDING GmbH	AN001193	Protective cap for implantable electrode unit for the Thomas Wireless System
Surgical equipment			Scissors, blunt-end forceps, spatulas, surgical clippers, dental drill, and cotton buds

Drugs and chemicals			Isoflurane, xylocaine, tramadol hydrochloride (Tramadol-CT, AbZ-Pharma GmbH, Ulm, Germany), dexpantenol eye salve (Bepanthen, Bayer AG, Leverkusen, Germany), 3% hydrogen peroxide, povidone-Iodine (Betaisodona, Mundipharma GmbH, Limburg, Germany) and 70% ethanol;
Fixation material including			Stainless steel screws (BN650 M1.2x5; 4.7 mm), acrylic resin (Paladur, Heraeus Holding GmbH, Hanau, Germany), ultraviolet glue (Cyberbond U3300, Cyberbond Europe GmbH, Germany) and cap protector (Thomas Recording GmbH, Giessen, Germany);
Additional material			Gloves, heating pad, syringes, and physiological saline.
Small Animal Stereotaxic Instrument (SASI)	Thomas RECORDING GmbH	AN000287	The model should be chosen according to the animal (rat, guinea pig, monkeys, etc) used in the study
Video camera	EverFocus		EverFocus, model: EQ150
Open field			Made of transparent or gray acrylic, having round shape measuring 40x40x40cm
Elevated plus maze			Made of gray acrylic and consisted of two open arms (50 cm long x 10 cm wide) and two closed arms (50 cm long x 10 cm wide, with 40 cm high walls) that extended from a central platform elevated 50 cm above the floor.