

STAIRMED

Full-stack neuroelectrophysiological solution


Long-term stability


Multi-brain region


High-throughput

Customizable

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Stairs Up For Human Health.

Stairmed.



About StairMed

Shanghai StairMed Technology Co., Ltd. (abbreviation StairMed) was established in August 2021 and is based in Shanghai. It is an innovative technology company focusing on implantable brain-computer interface.

Based on the implantable brain-computer interface technology, the company is committed to the research and development of neural interface (electrode), the development of implantable brain-computer interface platform system, and the clinical application transformation of related scientific research results, aiming to achieve more effective clinical treatments of neurological diseases.

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A full-Stack neurophysiological solution based on hyperflexible micro-nano electrodes

StairMed focuses on serving brain-computer interface and basic scientific research in neuroscience, with its self-developed and manufactured ultra-flexible micro-nano electrodes as the core product, providing a full-stack solution to unravel the essence of neuroscience.

The full-stack solution of StairMed includes HNE ultra-flexible micro-nano electrode, headstage, StairPlex High-throughput neural signal acquisition system, and AUFES portable implantation robot, providing a full set of advanced equipments and technical services for scientific research users around the world.

Product Introduction

HNE ultra-flexible micro-nano electrode has the advantages of ultra-flexibility, ultra-fineness, high precision, high throughput, high density, high biocompatibility, and low damage. HNE can meet various experimental needs, enabling high-precision, high-quality, and long-term stable recording brain neural electrical signals. It offers superior recording performance which is impossible with Rigid electrode .

Main Materials

Polyimide, Iridium Oxide, etc.

Key Applications

HNE are mainly used in in-vivo electrophysiology scientific research, and is generally implanted into the brains of living animals (mice, rats, non-human primates, etc.) for acute or chronic large-scale neural data acquisition, which can support the collection of local field potentials (LFP) and action potentials.



Product features



Long-term stability

Stable signal recording ≥ 300 days



High-biocompatibility

no immune epilepsy scars, no strong immune response



Customizable

The structure and site arrangement of the electrodes are customized according to the needs based on different research objects, target brain regions, and experimental paradigms .



High-precision

Capable of recording neural activity at the single-neuron level



High-throughput

Simultaneous recording of 1024 channels



Ultra-fineness

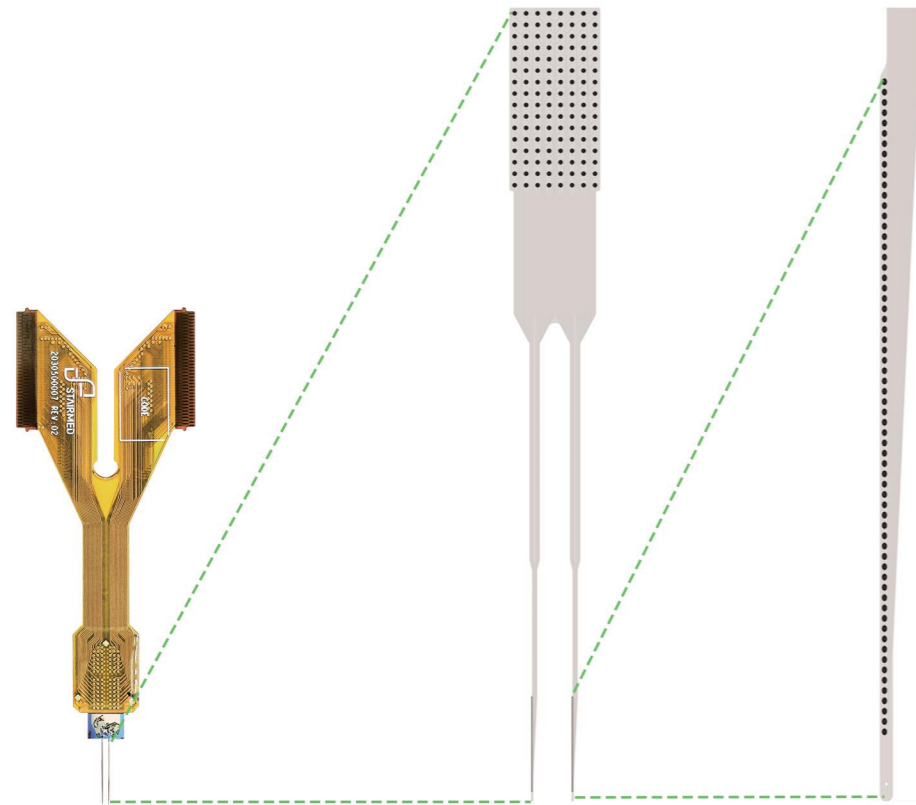
The cross-section of the electrode shank is comparable to the size of a neuron.

HNE ultra-flexible micro-nano electrode

超柔性微纳电极

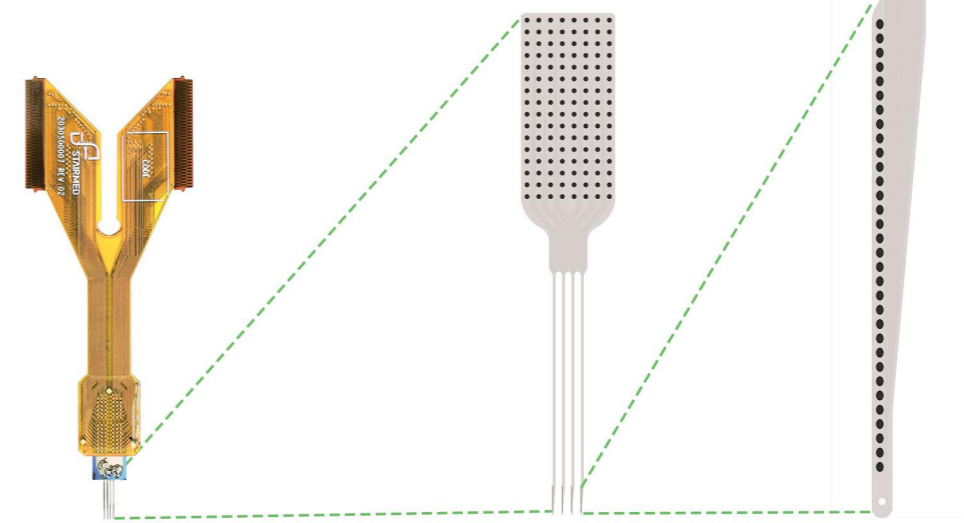
Monkey HNE:

HNE-128-2-1-0.55-50*50-65-1.00-6.5-SE



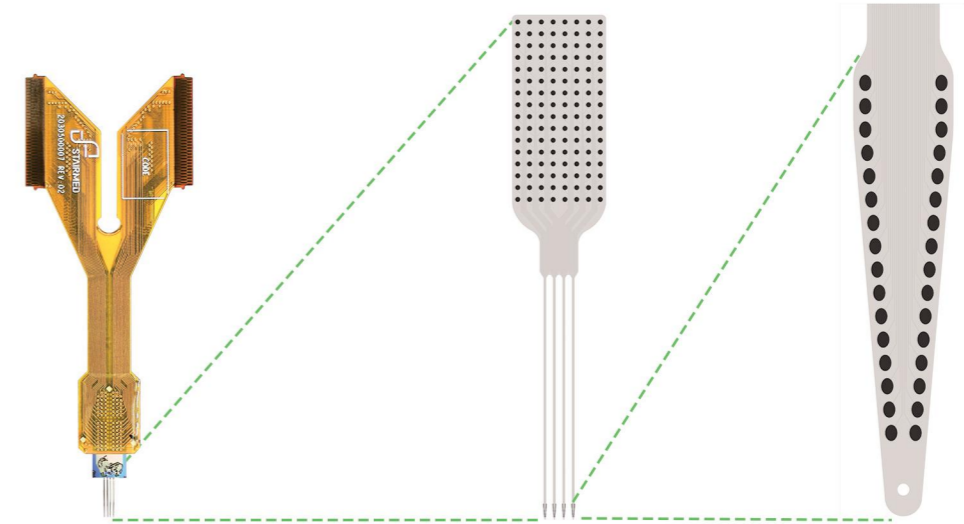
Mouse HNE:

HNE-128-4-1-1.10-16*25-35-0.25-4-SE



Mouse HNE:

HNE-128-4-2-0.55-16*25-35-0.25-4-SE



model	total locus	total shank	single shank locus row	locus cover length(mm)	locus size (μm)	locus spacing (μm)	Tungsten needle spacing(mm)
HNE-128-2-1-0.55-50*50-65-1.00-6.5-SE	128	2	1	4	50 X 50	65	1
HNE-128-4-1-1.10-16*25-35-0.25-4-SE	128	4	1	1.1	16 X 25	35	0.25
HNE-128-4-2-0.55-16*25-35-0.25-4-SE	128	4	2	0.55	16 X 25	35	0.25

* Different signal acquisition equipment might cause the channel sequencing to differ More details could be found in the electrode CHANNEL MAP.

StairPlex High-throughput neural signal acquisition system

StairPlex高通量神经信号采集系统



The StairPlex System is a scalable, high-throughput signal acquisition system that captures, processes, and analyzes action potentials (Spike), local field potential activity (LFP), and other neuroelectrophysiological signals to meet a wide range of neuroscience research needs.

The system consists of **a data acquisition control box, a data transmission line, and a headstage.**

Product size : 218.5 x 190 x 68.5

Signal types : Spike, LFP, ECoG

Data format : SPR

Compatibility : compatible and wired Headstage

Sampling rate : up to 30 k Hz

Product weight : 1750g

Sampling accuracy : 16 bits

Sampling throughput : 0.1Hz-7.5k Hz

Number of supported channels : 128-1024

Impedance measuring range: 10 K Ω -10 M Ω

Input interface: 2-channels digital input, 2-channels analog input

Output interface: 2-channels digital output, 2-channels analog output

Scalability : Headstage has 128 modules in a single module, and a maximum of 8 modules

Headstage
微型放大器



Interpolation 128-channel headstage

Number of channels: 128

Input interface: ZIF-71 pins x 2

Data interface: Type-c

Size : 19mm x 7mm

Transmission interface: LVDS protocol,
high-speed serial digital data



Extrapolation type 128-channel headstage

Number of channels: 128

Input interface: ZIF-71 pins x 2

Data interface: Type-c

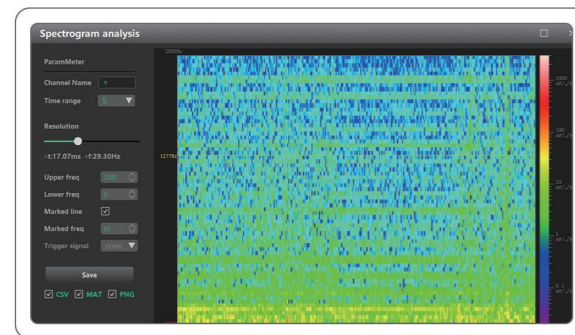
Size: 25mm x 18mm

Transmission interface: LVDS protocol,
high-speed serial digital data

Data Acquisition and Analysis Software

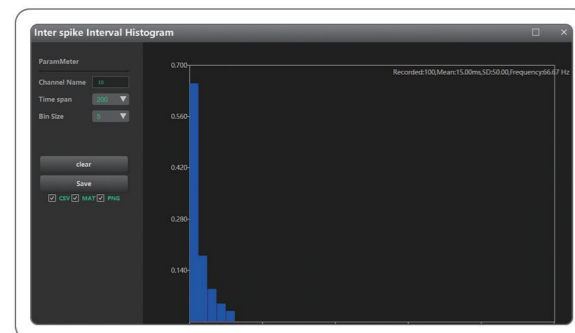
数据采集分析软件

StairPlex software is a powerful electrophysiological signal acquisition and data analysis software.



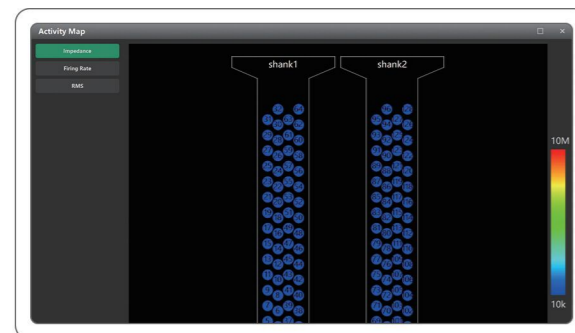
Dynamic visualization

A single interface supports the display of 128 channels
Up to 1024 channels can be displayed simultaneously
Multiple types of data are displayed synchronously



Fully functional

Neural signal acquisition display
Synchronous recording of behavior signals
Electrode impedance test function
Real-time online filtering and noise reduction



Real-time analytics

Discharge frequency analysis ISI
Spectrum Analysis, RMS noise analysis
Signal-to-noise ratio analysis
Channel activity topology map

Signal generator

信号发生器

Area of application

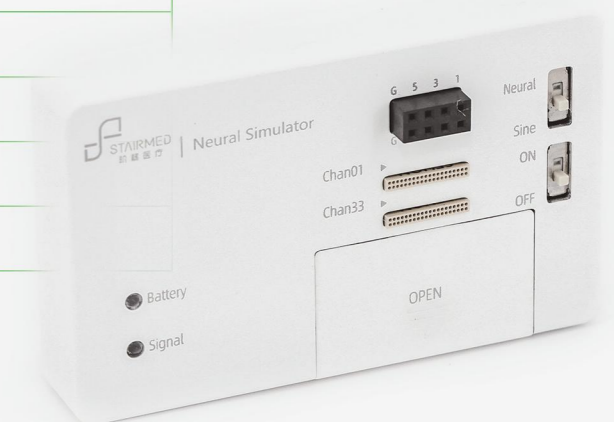
The signal generator (NS-1.0) is available as an accessory to the Stairplex and provides a reliable standard signal source (spike analog and sine wave) for pre-use or periodic performance testing of in-vivo neurophysiological signal acquisition systems .

Product advantage

- 1.It supports the simultaneous output of multiple signals from different output interfaces to meet the needs of customers for simultaneous acquisition and analysis of multi-channel signals in the process of data acquisition and system verification.
- 2.The ability to generate high-precision signal waveforms enables accurate measurements, reduces errors, and improves the reliability of test results.

Product parameters

Types of connectors	Pin, Omnetics connector, Zif connector
Type Specification	NS-1.0
Sampling accuracy	16bits
Charging voltage	5V
Charging current	500mA
Charging interface	Type-c
Output signal type	Spike、Sine



AUFEIS Assisted implantation equipment

AUFEIS辅助植入设备

Precise positioning Adapt to the animal brain stereotaxic instrument to accurately locate the targeted brain region

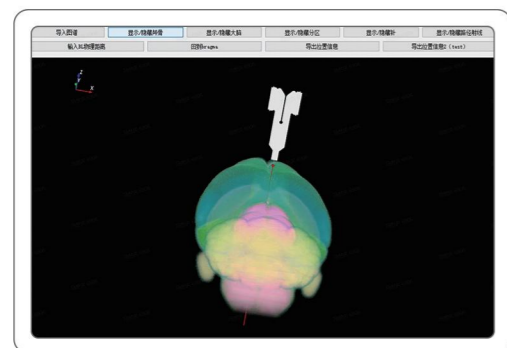
Automatic implantation Set the parameters by yourself, one-click automatic implantation

One-button needle withdrawal Set the withdrawal parameters to avoid taking out the flexible electrode.

Efficient and convenient Ergonomic design, convenient and efficient operation, stable and rapid implantation



Implant auxiliary control software



3D intuitive display
Efficient operation to improve the success rate of implantation



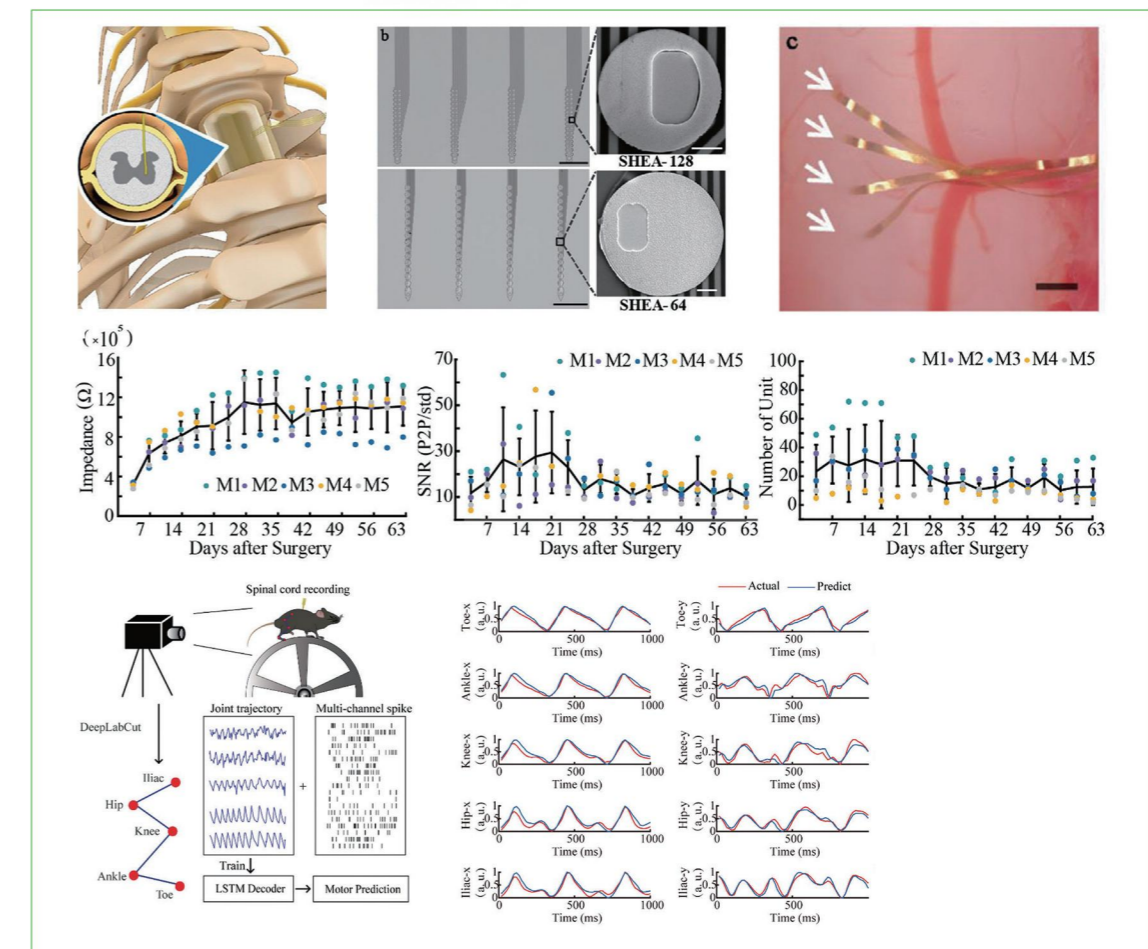
Precise positioning
One-button needle withdrawal
Automatic implantation

Research support

研究支持

A Ultraflexible Electrode Array for Long-Term Recording and Decoding of Intraspinal Neuronal Activity

- The biocompatible SC hyperflexible electrode array (SHEA) enables stable single neuron recordings in mice for more than 2 months.
- SHEA maintains stable impedance, signal-to-noise ratio, single-unit yield, and spike amplitude after implantation into mouse SC.
- Multi-unit signals recorded from the SC ventral horn can predict the mouse's movement trajectory with a high decoding coefficient of up to 0.95. Moreover, during step cycles, the neural trajectory of spikes and low-frequency local field potential (LFP) signal exhibits periodic geometry patterns.



Fan J, Li X, Wang P, et al., Adv Sci. 2023.