Energy storage silk implant

Are energy storage implants biocompatible?
Existing energy storage implants grapple with balancing factors such as high performance,biosafety,mechanical properties matching soft tissues,and conformal adhesion. Herein,we report a thin,flexible,and wet-adhesive zinc-ion hybrid supercapacitor (ZHSC) as an implantable power source with high biocompatibilityand superior performance.

What is pure silk?
Pure silk is innovatively employed,which is known for its excellent biocompatibility,to engineer water-triggered,geometrically reconfigurable membranes,on which functions can be integrated by Micro Electro Mechanical System (MEMS) techniques and specially functionalized silk.

Can silk fibroin-based ion-exchange membranes power implanted medical devices?
Powering implanted medical devices (IMDs) is a long-term challenge since their use in biological environments requires a long-term and stable supply of power and a biocompatible and biodegradable battery system. Here, silk fibroin-based ion-exchange membranes are developed using bionics principles for reverse electrodialysis devices (REDs).

Can Silk sericin be implanted based on a piezoelectric principle?
To address this demand,it is proposed utilizing a natural biomaterial,silk sericin (SS),which exhibits valuable biological activities and contains abundant asymmetric amino acids with adjustable structures,to create an implantable self-powered system based on the piezoelectric principle.

Do functional bioelectronic implants need energy storage modules?
Functional bioelectronic implants necessitate energy storage modulesas power sources in vivo. Existing energy storage implants grapple with balancing factors such as high performance,biosafety,mechanical properties matching soft tissues,and conformal adhesion.

What is a stretchable energy supply device for implantable electrical stimulation?
Yuan et al. proposed a stretchable, rechargeable energy supply device for implantable electrical stimulation (Fig. 3 d). This innovative device incorporates a stretchable energy-receiving coil, conductive wiring, and supercapacitor current collectors, all fabricated using liquid metal components integrated onto an elastic substrate.

The bioresorbable energy storage devices are shown in Fig. 3. Lee et al. reported biodegradable micro-supercapacitor (Fig. 3a) which was fabricated using ...

Here, we describe a new technique for application to IEMDs that is capable of providing energy storage using the natural ions of body fluids as electrolytes in ...

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Bioinspired and bioderived materials obtained from silk cocoons provide exciting pathways for creating precision medicine, and advanced personalized monitoring devices. Both ...

We report a geometrically reconfigurable silk-based electronic implant designed for peripheral nerve monitoring. Metallic conductive structures were fabricated on the surface of a ...

The integration of energy storage and delivery devices such as supercapacitors (SCs) with properties such as flexibility, miniaturization, biocompatibility, and degradability are sought for ...

Here, we describe a new technique for application to IEMDs that is capable of providing energy storage using the natural ions of body fluids as electrolytes in a supercapacitor (or ...

This review paper provides a comprehensive overview of the historical development of implantable medical electronics (IMEs) and three main categories of applicable ...

With outstanding mechanical properties and tunable biodegradability, these silk-based devices are excellent candidates for "implant and forget" kind of applications.

Due to excellent mechanical properties and biocompatibility, materials based on silk fibroin are increasingly included in advanced biomedical research and applications. ...

The development of biodegradable power sources has opened new avenues for transient bioelectronics, offering temporary energy solutions for implantable medical devices. This ...

Abstract With the rapid development of biomedical and information technologies, the ever-increasing demands on energy storage devices are driving the development of skin ...

Pure silk is innovatively employed, which is known for its excellent biocompatibility, to engineer water-triggered, geometrically reconfigurable membranes, on ...

Functional bioelectronic implants necessitate energy storage modules as power sources in vivo. In this work, a thin, flexible, and wet-adhesive zinc-ion hybrid supercapacitor ...

The evolution in the field of energy storage devices has gained the scrutiny of many researchers due to their inevitable applications in everything from convenient electronic ...

Recently, iPENGs and iTENGs have been widely used for biomechanical energy harvesting and storage. Yu et al. have developed an iPENG and implanted it into the rat ...

Implantable self-powered devices Inside human bodies, the feasible choices for replenishing the power supply

are either scavenging human-body energy or delivering energy ...

Flexible and body-compliant devices -based on eco-friendly materials represent one of the most challenging needs to monitor human health continuously and seamlessly, ...

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