Self Assembled Peptide Hydrogel (Ramot)

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The Technology

A breakthrough Self Assembled Peptide Hydrogel (SAPH) has been developed. SAPH is a safe, self-assembled, biocompatible, remarkably strong hydrogel with modulated stability that is suitable for various medicinal and cosmetic applications.

SAPH is based on the highly efficient self-assembly of the short aromatic peptides diphenylalanine. The discovery and development of SAPH is the current stage of world renown, ongoing research, led by Prof. Gazit and his team, back in 2001. The first finding of the research was that aromatic interactions play a pivotal role in the self-assembly process governing the biological fibril formation. This understanding had been translated not only to an extensive research on protein aggregation treatment, but also led to additional applications such as organic self-assembly nanotubes and the self-assembled hydrogel. SAPH is formed under mild conditions in aqueous solution and contains less than 1% peptide material; it's simple building blocks allow simple production process and chemical modifications capabilities allowing tailoring SAPH towards various needs. Aromatic interactions are also responsible for the remarkable rigidity displayed by SAPH, in spite of the short building block size. SAPH rigidity exceed those of known hydrogels, formed by much larger polypeptides .Biocompatible self-assembled Hydrogels such as SAPH are extremely crucial for a vast number of applications including tissue engineering and axonal regeneration, sustained drug release and cosmetic applications.

Potential Application

- Combination of the three dimensional conformation together with the ability to incorporate growth factors in a unipolar direction and it's unique rigidity make SAPH a lucrative system for tissue engineering and axonal regeneration
- A safe and better alternative for cosmetic implants and fillings such as silicon and Botox
- Drug delivery: sustained drug release upon certain modifications of the SAPH building blocks.

Stage of Development

- SAPH was shown to be very stable under extreme conditions such as pH, temperature acidic conditions etc.
- SAPH can be shaped in accordance to the vessel it is assembled in.
- It is inherently safe and exerts no side effects in mice models
- SAPH exhibit remarkable rigidity with a Young's module of 20 GPa
- SAPH provided 3D scaffold for CHO cells
- In vivo studies are on going to demonstrate SAPH capabilities to serve as a "smart scaffold" for axonal re-generation and as hydrogel for cosmetic use.

Patents

Granted US patent US 7,786,086; PCT patent applications (WO2007/043048 and WO2011/151832).

Supporting Publications

Reches, M, & Gazit, E. (2003) Casting metal nanowires within discrete self-assembled peptide nanotubes. Science 300, 625-627.

Mahler, A., Reches, M., Rechter, M., Cohen, S., and Gazit, E. (2006) Novel Self-Assembled Gel Biomaterial Composed of Modified Aromatic Dipeptide. Adv. Mater. 18, 1365-1370. (Featured in an inside front cover).

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