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Graphene Electrodes on a Planar Cubic Silicon Carbide Long Term Implantable Neuronal Prosthetic Device

Researchers at the University of South Florida have developed a combination of novel materials for the generation of a planar neural prosthetic used for a brain machine interface (BMI) device.

One of the problems with long term, implantable biomedical devices arises from the response of the body to one or more of the materials that are used to construct the device or the degradation of the material due to the body environment. Biomedical devices gained an entire new level of complexity with the advent of the microchip which adds electrical interaction with the cells to the previously utilized mechanical interaction. Unfortunately, direct long term interaction for the microchip with the body is difficult as most of the materials used in the micro chip are chemically reactive, toxic, or both and must be hermitically sealed to maintain a degree of biocompatibility.

Our inventors have developed an implantable neuronal prosthetic device using a combination of two novel materials cubic silicon carbide and graphene. This technology overcomes the problem of biocompatibility in long term implants. 3C-SiC and Graphene have excellent mechanical and electrical properties making it an valuable option to make neural prosthetic used for a brain machine interface (BMI) device.

ADVANTAGES:

- **High degrees of biocompatibility**
- **Physically and chemically resilient**
- **Large specific capacitance in electrolytic functions**
- **Double the surface area of carbon nanotubes**
- **Exceptional mechanical and electrical properties**

Replaces Regular Carbon Nanotubes to Overcome Low Biocompatibility of Implants

A Simulation of Neuronal Prosthetic Device in the Human Brain

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