Apparatus and Method for Neurostimulation by High Frequency Ultrasound

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Technology description

Wireless needle-sized neurostimulators powered by ultrasound technologies provide a new method of applying electrical stimulation to tissue. Current approaches involve either the direct application of current to tissues via pacemaker-sized implanted devices or indirect application of electrical currents through the body surface. Unfortunately, implanted neurostimulator devices can be bulky and application of electrical currents to the body surface has specificity and depth problems due to diffusion and high electrical losses in tissue.

Professor Bruce Towe, of Arizona State University, has developed further additions to his portfolio of miniature ultrasound neurostimulation technologies. The latest additions utilize wireless stimulation waveform monitoring, stimulation current feedback control, and electrode-tissue impedance monitoring, all of which allow for improved and efficient ultrasound neurostimulation of different nerves and tissues. This device system also incorporates new safety improvements that limit the amount of current transmitted to the body tissue.

With the addition of this new ultrasound neurostimulator system design to his expanding repertoire, Dr. Towe continues to be at the forefront of the microscale neurostimulator field and builds upon an already impressive portfolio of ultrasound and microwave-based neurostimulation technologies.

Application area

Ultrasonic miniature neurostimulators can be placed in the:

spine for pain control

Brain for Epilepsy

Vagus nerve stimulation for epilepsy

Muscle for functional electrical stimulation

Advantages

Passive, miniature implanted stimulator form factor - doesn't require use of a battery

Much lower power consumption compared to rf microwave or coil inductive powering methods

Incorporates an electrode-tissue impedance sensing for improved implant functionality and performance monitoring

Improved implant visualization and localization with ultrasound imaging systems

Institution

Arizona State University

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