

## **Fracture and fatigue behavior of multi-strand implantable electrodes**

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### **ABSTRACT**

Material and structural evaluation, analysis, and testing of implantable electrodes and interconnects that form part of the Networked Implantable Neuroprostheses Systems (NNPS) is being investigated. The response of various configurations (1x7, 1x19, 7x7, 7x19) of helically-twisted cables to static and cyclic mechanical loading imposed during long-term implantation is being studied. Monotonic tensile tests were performed and the fracture surfaces of the cables were observed with scanning electron microscopy (SEM) to reveal the fracture mechanisms involved. Fully reversed cyclic tests of the cables were conducted in a flex tester under various strain loading conditions in order to determine the fatigue behavior of the cables. The fatigue behavior of the cables tested in this manner was modeled using the Manson-Coffin relationship while the effects of changes in mean stress on the fatigue behavior of the cables was also studied. The effects of changes in material and cable configuration on the fatigue performance will be summarized for AISI 316LVM and silver-cored Drawn Filled Tube (DFT) cables.