



SENIOR DESIGN ORGANIZATION SYNOPSIS – FALL 2013

NEUROSTIMULATOR CONNECTOR

Team 6: J. Ciurdar, E. Doan, S. Grada, MM. Lopez

Faculty Advisor: Dr. W. Kinzy Jones

Implantable neurostimulation devices generate electrical stimulation to treat various disorders involving neurological problems. There is a variety of applications for the neurostimulator in the medical field ranging from blindness to neurological disorders. The neurostimulator is composed of a connector assembly which connects to the leads, thin wires that deliver electrical pulses from the neurostimulator. Present day technology commonly offers 16 contacts directly attached to the neurostimulator, which means that the leads and stimulator are hardwired together. This could pose a problem if failure occurs with either the lead or the stimulator as both items would have to be removed. Nerves and tissue grow around the leads over time, which means nerves will also be damaged when replacing the system. The limited number of contacts provided by the current connector does not meet the need of patients suffering from advanced neurological that require more stimulation.

The goal for this project is to fabricate a biocompatible, hermetic connector that contains 32 contacts for coupling to the leads as well as decreasing the size of the device. This optimizes the neurostimulation device by increasing the amount of electrodes in a smaller area, allowing for an increased array of stimulation from the device. The connector is made with High Temperature Co-fired Ceramic, a common material used in microelectronics along with titanium and platinum. This was accomplished by laminating and firing multiple layers of material together and integrating the connecting pathways within the layers, which was then packaged in biocompatible materials and hermetically sealed. The materials being considered are a composite of glass and ceramic materials or an alumina-ceramic material. It must be biocompatible for internal use in the human body. Overall, the electronic packaging provides an easier way to assemble the neurostimulator, thus preventing problems for both the doctor and patient during the implantation or exchange of such devices.