



Applications

- Magnetolectric device for use in minimally invasive surgery
- Procedures requiring micro cutting (i.e. plaque removal or osteotomy)

Advantages

- Provides tactile feedback to surgeons from a remote location
- Provides spatial awareness and obstruction detection
- Damping to provide added safety by removing unwanted vibrations
- Added safety with closed loop feedback

Inventors

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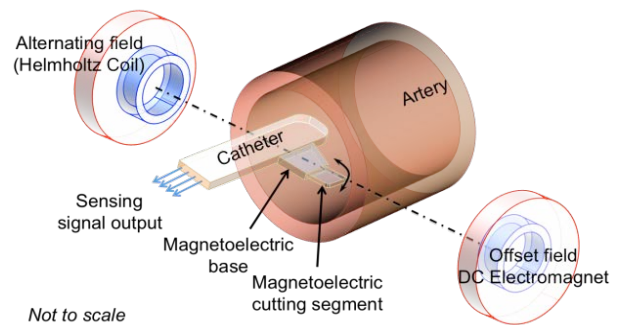
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Technology Summary

Minimally invasive techniques are often employed to perform surgical procedures involving micro cutting or ablation. Many of the tools used in these techniques rely on a surgeon’s ability to manually operate the tools at the injury site. Devices made from currently available smart materials such as piezoelectrics are less than ideal due to the high voltages required for operation and the lack of feedback. This requires the surgeon to perform minimally invasive procedures without haptic feedback and leads to safety issues such as internal bleeding resulting from nicking of tissue. Surgical tools made from self-sensing smart materials would provide increased safety in minimally invasive procedures and make surgical treatment accessible.

VCU researchers have developed a new device for minimally invasive surgery with applications in micro cutting procedures like plaque removal from arteries or tissue ablation. The technology consists of a small magnetolectric cantilever that serves as a scraping tool, which can be fixed to the end of a catheter and inserted into the body. The “up and down” scraping action is produced by the magnetic field around the magnetolectric material. Additionally, a closed loop mechanism allows the surgeon to adjust the frequency of the scraping action or receive tactile feedback from a remote location. Finally, an additional magnetolectric segment provides damping of undesirable vibrations and subsequent stabilization of the fixed end of the scraping tool. These features result in a safe cutting tool that may be utilized in minimally invasive surgery.



A conceptual illustration of the magnetolectric device as a surgical catheter removing plaque from an artery. “Characterization of Magnetolectric Cantilever for Use as an Ablation Tool in Minimally Invasive Surgery” by V. Sundaresan and J. Atulasimha.

Technology Status

U.S. Patent: 8,602,034

This technology is available for licensing to industry for further development and commercialization.