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3D Printed Sensing Stents

AzTE Case # M14-017L

Inventors

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Invention Description

Stents are continually evolving, especially with the development of newer and better materials and increasingly complex shapes and capabilities. However, despite all their advancements, stents are still at risk for complications such as blood vessel damage during implantation, and thrombosis, restenosis, clots, scaring, etc., after implantation. Stents having the ability to continuously monitor vessel environments would enable a practitioner to prevent or quickly treat those potential complications.

Researchers at Arizona State University have developed a novel 3D printed stent that is able to monitor the environment into which it has been implanted. These stents are made of specific biocompatible materials which can measure deformation and act as a strain gauge. The stent can take measurements during implantation as well as after surgery to monitor for growth or changes in aneurysms or blood vessel compliance. Measurement data can be wirelessly transmitted to a receiver outside the body.

This technology effectively and efficiently enables the development of a new generation of smart stents which could very well reduce complications related to surgical stent procedures while using simple and cost effective materials.

Potential Applications

- 3D printed stents with deformation/strain sensing capabilities for measuring physiological changes in the environment indicative of :
    - Restenosis
    - Stent thrombosis
    - Aneurysm
    - Insertion site damage

Benefits and Advantages

- 3D printing allows for custom producing stents for specific sites in the body and/or for specific needs of a patient
- Simple and cost effective materials
- Can be used to monitor the performance of the stent
- Reduces the need for costly and time consuming procedures to test the integrity of the implanted stent/vessel wall
- Quickly identifies problems in stent performance
- Non-bulky transmitter and power source
    - Power source may include current from electrochemical oxidation of glucose or other enzymatic reactions, or harnessed energy from arterial contractions and expansions

Intellectual Property Status:

Patent Pending

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