

Implantable Blood Detection Device based on Shape Memory Polymer

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Abstract

The detection of blood in the aorta plays a guiding role in the prevention and treatment of cardiovascular diseases. The detection of local blood in the diseased vessels is a difficult subject in scientific research. This paper introduces a sensor for local blood detection that can be combined with a cardiovascular stent. The sensor uses shape memory polymer (SMP) as a flexible substrate. After the cardiovascular stent enters the lesion site of human body, the device is deformed by external conditions to complete the device deployment and fixation. The sensing unit endows the interdigital electrode with unique stretching and bending characteristics through the design of the serpentine wire. The detection sensitivity and detection limit of the sensor can be adjusted by designing the number and length of the interdigital electrode through electric field simulation. Finally, the blood detection device was fabricated by 3D printing and several key blood parameters were tested, and the accuracy of the device was evaluated.

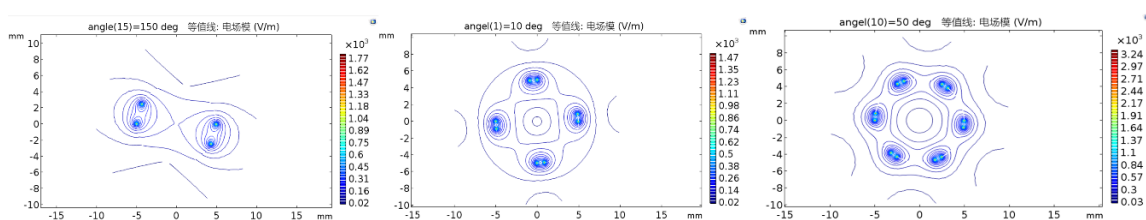


Figure 1: Multi-electrode Electric Field Simulation Diagram. With the increase of the number of electrodes, the electric field distribution becomes more and more uniform.

References

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