This work presents a deep study of an electromechanical structure focused in the detection of the *Staphylococcus Epidermidis* through the capacitance response. Thanks to the numerical simulations of the device, we can understand and improve the detection of this bacteria due to the manipulation produced by the dielectrophoretic phenomena, which is given by an external macroelectrode.

It is a point of interest the study and detection of pathogens involved in quite different group of diseases associated with implanted medical devices, like the *Staphylococcus Epidermidis*, a coagulase-negative *staphylococci* present on the skin, who is a commonly cause of post-carditomy endocarditis, infections of in-dwelling intravenous catheters, prosthetic, and orthopaedic devices, transvenous cardiac pacemakers, infections of the Spitz-Holzer valve used in the treatment of hydrocephalus, and many others. Because the dielectrophoresis (DEP) is the movement of particles induced by polarization effects in non-uniform electric field, we can use DEP for selective separation and manipulation of bioparticles like *Staphylococcus Epidermidis*, which can be detected by using it as a dielectric in a capacitor, thanks to the electrical characteristics of the bacteria.

Hence, a circular interdigitated microelectrodes (IDEs) with an electrokinetic-driven macroelectrode is used to detect and manipulate, respectively, the bacteria in a microfluidic channel. The IDEs have a diameter of 250μm, which is composed with 2μm-wide and 4μm-spaced electrodes, the macroelectrode is a 50μm-wide annular-ring separated from the IDEs for 50μm. Both IDEs and macroelectrode are made of 1μm-thick aluminium covered with a 33nm-thick layer on a silicon oxide substrate.

We will show the results obtained for the simulations of the capacitive response of the device due to the presence of the bacteria in the IDEs, and the improved response of the device due to the actuation of DEP using the macroelectrode.

**Keywords:** BioMEMS, Dielectrophoresis, Staphylococcus Epidermidis

**References:**


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