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Quantitative Analysis of Carcinoembryonic Antigen (CEA) Using Micromechanical Piezoresistive Cantilever

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Abstract : In this work, we have used arrays of micromechanical piezoresistive cantilever with different geometries to detect carcinoembryonic antigen (CEA), which is known as an important biomarker associated with various cancers such as the colorectal, lung, breast, pancreatic, and bladder cancer. The sensing principle is based on the surface stress changes induced by antigen–antibody interaction on the microcantilevers surfaces. Different concentrations of CEA in a human serum albumin (HSA) solution were detected as a function of the deflection of the beams. According to the experiments, it was revealed that microcantilevers have surface stress sensitivities in the order of 8 (mJ/m). This matter allows them to detect CEA concentrations as low as 3 ng/mL or 18 pM. This indicates the fact that the self-sensing microcantilever approach is beneficial for pathological tests.

Keywords : micromechanical biosensors, carcinoembryonic antigen (CEA), surface stress
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