

Cantilever and Transducers

Keywords: Chemical Sensor Array, Biosensor, Cantilever Array

SUMMARY OF INVENTION

The following invention describes a sensor system based on arrays of microfabricated cantilevers for detecting a target substance in a reference liquid, comprising a measurement cantilever functionalized by application of a first coating to one of the measurement cantilever's surfaces, whereby this first coating is sensitive to the target substance. In addition the system comprises a reference cantilever with a reference coating on one of the reference cantilever's surfaces, whereby this reference coating is less sensitive to the target substance than the first coating. Both cantilevers are arranged such that they can be exposed in a reference step to the reference liquid and in a detection step to the reference liquid with the target substance. A detector unit is employed for determining the deflections of the measurement and the reference cantilevers during the reference step and the detection step. Finally, the difference between deflection responses of measurement and reference cantilevers is calculated.

Application area: Transduce molecular recognition, chemical affinity or a physical property into a mechanical response by means of cantilever-based sensors. Such processes include for example antibody-antigen binding, detection of proteins or DNA hybridization.

Advantages over other technologies: The method works without the need to use labeled molecules such as molecules with radioactive or fluorescent tags. The concept of using measurement and reference cantilevers allows to cancel out undesired effects such as thermal drifts or reactions taking place at non-functionalized cantilever surfaces. The method requires only a few ten microliters of reference liquid with target substance for detection and yield results within minutes.

Implications for cantilever based techniques: Intellectual property protected by this patent claims for example a cantilever sensor system of two and more cantilevers functionalized as measurement cantilevers including at least one reference cantilever. The cantilevers might be functionalized with at least one or more sensing layers, of which there might be at least one metal layer. The sensor layer might contain single stranded DNA or RNA oligonucleotides tied down to the cantilever surface by thiol or silane chemistry. The coating might be sensitive to pH changes. The detection of static deflection might be optically or piezoresistive. The target substance might be a particular atom or a molecule, a particular cell, a particular virus, bacteria or micro-organism, or a particular biomolecule. Realizations also include: 1) a container with a bendable, micromechanical lid functionalized with a sensor layer for opening or closing the container containing for example a pharmaceutical substance and 2) a functionalized switch to influence the liquid flow through a liquid flow system.

IP-Position

Owner: IBM and University of Basel

Status: Patent granted

licensing/sale conditions: The technology is available on a non-exclusive basis.

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