The Nanomotion Sensor: real-time characterizations in biomedicine

S. Dinarelli[1,2]

[1]Istituto di Struttura della Materia, CNR, Via del fosso del cavaliere 100, Roma (IT)
[2]Dipartimento di Scienze di Base Applicate all'Ingegneria, Sapienza Università di Roma, Piazzale aldo moro 5, Roma (IT)

The insurgence of newly-arising, rapidly-developing health threats, such as drug-resistant bacteria and cancers, is one of the most urgent public-health issues of modern times. This menace calls for the development of sensitive and reliable diagnostic tools to monitor the response of a single cell to chemical or pharmaceutical stimuli [1]. Recently it has been demonstrated that all living organisms oscillate at a nanometric scale and that these oscillations stop as soon as the organisms die. These nanometric scale oscillations can be detected by depositing living cells onto a micro-fabricated cantilever and by monitoring its displacements with an atomic force microscope electronics. Such devices, named nanomotion sensors [2], have been employed to determine the resistance profiles of life-threatening bacteria within minutes, to evaluate, among others, the effect of chemicals on yeast, erythrocytes and cancer cells. The data obtained so far demonstrate the advantages of nanomotion sensing devices in rapidly characterizing microorganism susceptibility to pharmaceutical agents [3].

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