Nanomechanical and Optomechanical Systems for Cancer Research

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The advances in micro- and nanofabrication technologies are enabling increasingly smaller mechanical transducers capable of detecting the forces, motion, mechanical properties and masses that emerge in biomolecular interactions and fundamental biological processes. Thus, biosensors based on nanomechanical systems have gained considerable relevance in the last decade[1]. This talk will provide insight into the mechanical phenomena that occur in suspended mechanical structures when either biological adsorption or interactions take place on their surface. In addition, I will show how coupling nanomechanics and nanooptics allows to achieve sensing devices with higher performance and novel transduction paradigms. I will describe then some relevant experiments running in our laboratory that harness nanomechanical and optomechanical systems for cancer research in three battlefronts: 1) ultrasensitive detection of cancer biomarkers in blood [2], ii) cancer cell nanomechanics [3], and iii) nanomechanical spectrometry [4-5].

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[3] Encinar, Calzado et al, in preparation
[4] Gil-Santos, E. *et al.* Nanomechanical mass sensing and stiffness spectrometry based on two-dimensional vibrations of resonant nanowires. Nature Nanotechnology **5**, 641-645 (2010).
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