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## Introduction

Medical analysis for prognostic and treatment follow up is evolving toward real-time, bed size, protein finger print and personalized medicine. Therefore the molecular sensors used to detect and quantify the molecular target of interest should be fast, to operate in real time, selective, to be insensitive to the so-called biological noise and detect the lowest analyte concentration and multiplexed to provide a comprehensive description of the overall biological activity of the patient

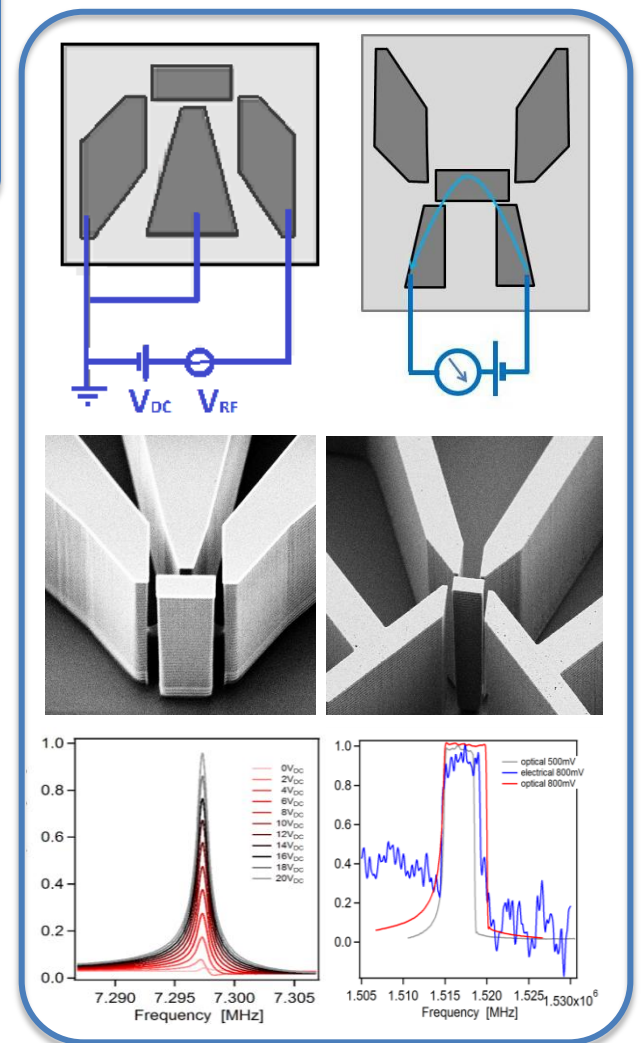
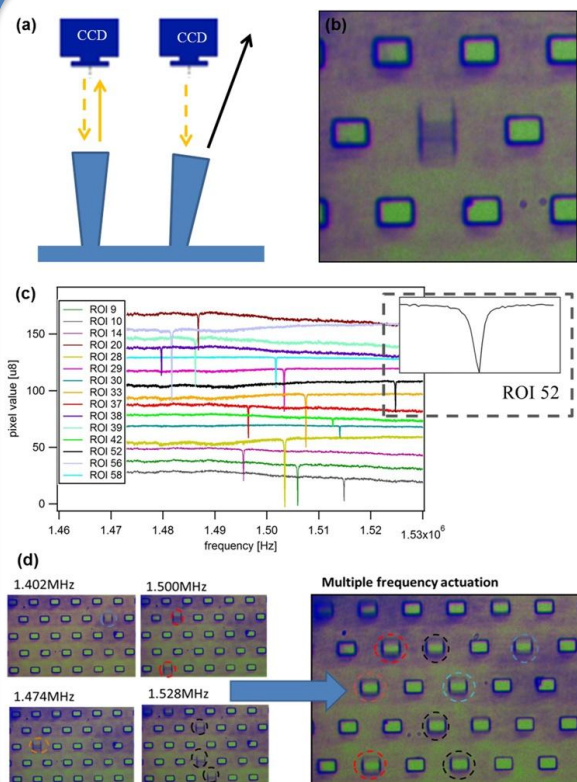
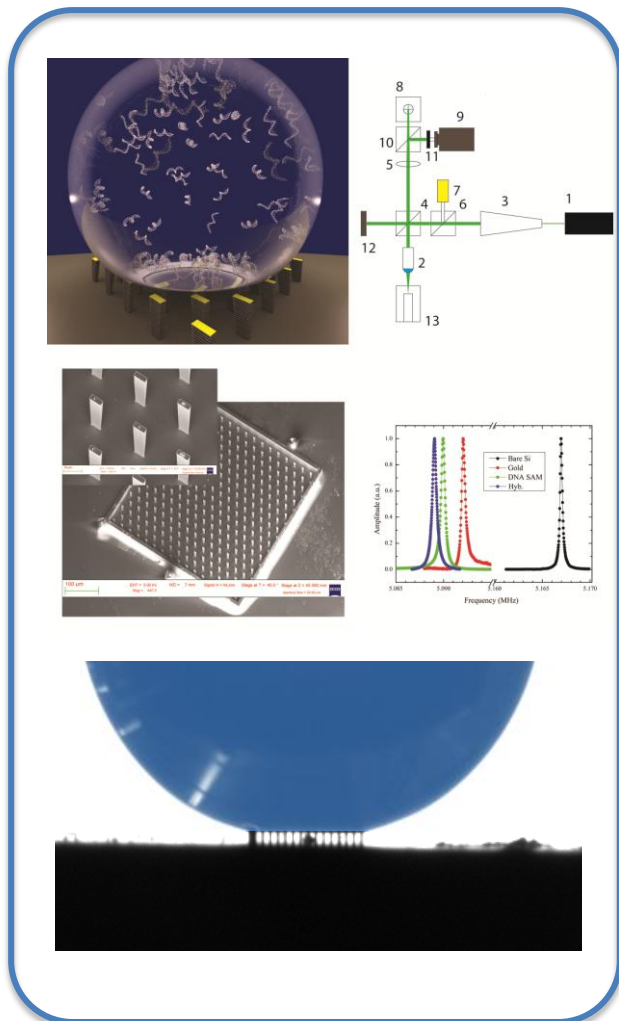
**Micro and nanomechanical sensors (NEMS) represent a promising new class of biosensors that may respond the requirements listed above**

BUT

**NEMS sensors, when operated in liquid, i.e. biological, environment, loose most of their extraordinary properties**

## The Idea/Concept

Design super-Hydrophobic pillars which can be operated in liquid and real time conjugating REAL-TIME analysis with the sensitivity of NEMS sensors



Arrays of hydrophobic pillars expose only the top to the liquid solution while the pillar oscillate in air

Arrays of independent pillars can be optically monitored in parallel with sensor density of  $10^5/\text{cm}^2$

Kelvin force actuation and electrical detection is Implemented for fully integrated operation

## Potential Impact

The development of the pillar approach represents an improvement in the direction of low cost early cancer marker screening, bed-side analysis, recurrence continuous monitoring and real time therapy monitoring and integration with continuous flow drug delivery systems.

The concepts of personalized medicine and early diagnosis of the most freighting diseases will become a step closer to reality.