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## BIOCDx: A novel PoC cancer treatment monitoring tool and the innovative concepts behind the fabrication of a reliable µTAS device

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Micro-total analysis systems (µTAS) and 'lab-on-a-chip' microfluidic platforms have attracted increasing attention due to their ability to integrate multiple biochemical processes in a single portabe device, thus permitting the screening of a plethora of medical, environmental and food samples at high speed and with minimal reagent consumption. Despite this, they have yet to realize their full potential. The BIOCDx device, a companion diagnostics tool for point of care (PoC) cancer treatment monitoring is the latest µTAS that our research group is involved with and that will be presented. It aims to provide a paradigm shift towards the development of a truly reliable and robust sensing system that can be succesfully commercialized through the employment of the most innovative concepts in a variety of scientific fields (photonic, nano-biochemical, micro-fluidic and reader/packaging), which will be brought together to overcome the difficulties commonly encounted in the development of such systems. Results on the design and fabrication of the individual units will be presented, while emphasis will be placed on the functionalization of the sensor surfaces and their modification with capture biomolecules. The most promising approaches for the enhancement of a biosensor's surface coverage with oriented capture biomolecules will be compared with the ultimate goal being the optimization of the sensor performance in terms of its sensitivity and its linear response over a wide dynamic range. Furthermore, the pivotal role of the laser induced forward transfer (LIFT) in surface bio(functionalization) will be extensively discussed.

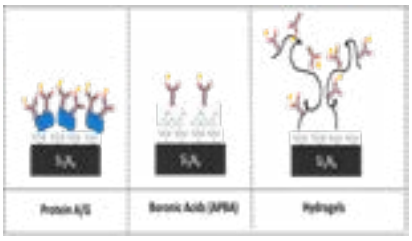

**Figure: 1.** Alternative approaches followed for enhanced and oriented immobilization of capture biomolecules..

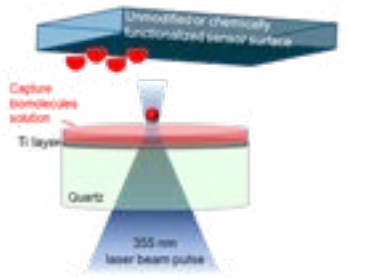


**Figure: 2.** The LIFT technique for surface (bio) functionalization.

### Recent Publications

1. Madianos L, Tsekenis G, Skotadis E, Patsiouras L and Tsoukalas D (2018) A highly sensitive impedimetric aptasensor for the selective detection of acetamiprid and atrazine based on microwires formed by platinum nanoparticles. Biosensors and Bioelectronics (2018)

2. Gounaridis L, Groumas P, Schreuder E, Tsekenis G, Marousis A, et al. (2017) High performance refractive index sensor based on low Q-factor ring resonators and FFT processing of wavelength scanning data references and links. Optics Express 25(7):7483.
3. Chatzipetrou M, Massaouti M, Tsekenis G, Trilling A, Andel E, et al. (2017) Direct creation of biopatterns via combination of laser- based techniques and click chemistry. Langmuir 33(4):848–853.
4. Tsekenis G, Massaouti M, Theodorakos I and Zergioti I (2016) Laser-functionalized aptamer-based photonic biosensors. SPIE Newsroom
5. Skotadis E, Voutyras K, Chatzipetrou M, Tsekenis G, Patsiouras L, et al. (2016) Label-free DNA biosensor based on resistance change of platinum nanoparticles assemblies. Biosensors and Bioelectronics 81:388–394.

**Biography**

G Tsekenis received his BSc (Hons.) Degree in Biochemistry and Genetics in 2004 from the University of Nottingham, UK and his PhD on Biosensors from the University of Cranfield, UK in 2008, where he was involved in an EC-funded project for the development of electrochemical immunosensors. Since then, and as a Postdoctoral Researcher, he has been involved in a further six EC- and nationally- funded projects, for the development of immuno- and apta-sensor LoC devices with applications in the medical, environmental and food industry fields. He has co-authored 23 peer-reviewed articles and he is a Reviewer in three international journals.

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**Notes:**