

Lab-on-chip for *Xylella fastidiosa* study

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Xylella fastidiosa subsp. *Pauca* is a particularly perilous gram-negative bacterium that caused the devastation of the landscapes in Salento peninsula and triggered a crisis in olive oil production [1], [2].

In response to this epidemic outbreak, our research group has developed two different Lab-on-chip. The first is a miniaturized qPCR system for an on-field detection: a printed circuit board (PCB) integrates a miniaturized heater, temperature sensors and a fan to perform the Real-time PCR thermal cycling. With an intuitive software in Labview, it is possible to control all process steps and detect *X. fastidiosa* by a laser and a detector integrated in the sample miniaturized system like a common thermal cycler would do.

The second is a biomimetic microfluidic device designed to replicate the pathogen's habitat, proposing a new tool to facilitate the study and evaluation of the therapeutic efficacy of novel drugs. The design aims to faithfully reproduce the physiology and geometry of olive tree xylem vessels including 16-45 µm wide and 40-60 µm high channels. The fabrication of the device involved the use of photolithography to produce an SU-8 master, created with a mask designed using CleWin software and produced by a specialized company. Utilizing the Mask Aligner MA6 Suss Microtech, the design was transferred from the mask to the photoresist through exposure to UV light. Subsequently, soft lithography was employed to create a PDMS replica of the chambers and channels, affixed to a glass slide through plasma treatment in order to conduct microfluidics tests.

Bibliografia

[1] Buja I, Sabella E, Monteduro AG, Chiriaco MS, De Bellis L, Luvisi A, Maruccio G., «Advances in Plant Disease Detection and Monitoring: From Traditional Assays to In-Field Diagnostics» Sensors, 2021.

[2] Chiriaco MS, Luvisi A, Primiceri E, Sabella E, De Bellis L, Maruccio G. «Development of a Lab-on-a-chip Method for Rapid Assay of *Xylella fastidiosa* subsp. *pauca* strain CoDiRO» Scientific Reports , 2018.