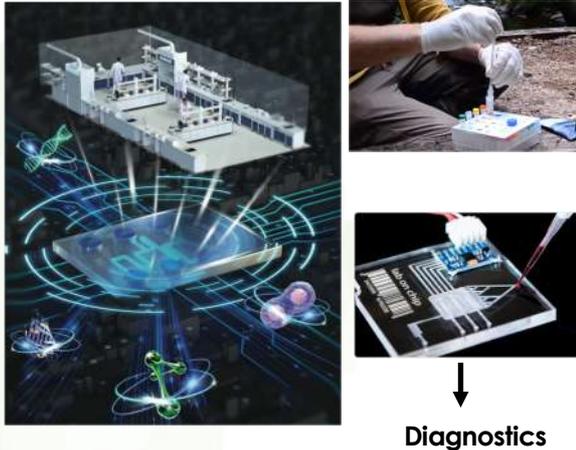


## LAB-ON-CHIP : new challenges for food quality testing

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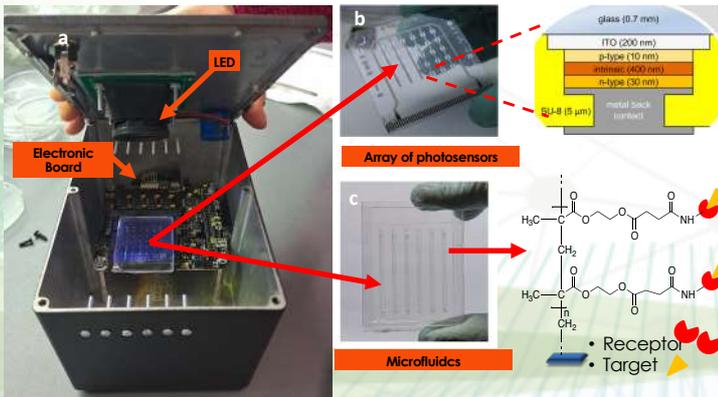
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**Lab-on-Chip** systems based on microfluidics are platforms containing microfluidic channels that integrates various laboratory operations and represent an excellent analytical systems, that ensure:

- **Ease of use:** Analyses comparable to those conducted in full analytical laboratories can be done in a chip that fits your hand.
- **Less human error:** Since it will strongly reduce human handling, automatic diagnoses done using lab-on-a-chip will greatly reduce the risk of human error.
- **Fast response time:** At the micrometric scale, the flow switch, and diffusion of chemicals and heat are faster. One can change, for example, the temperature in hundreds of ms, which enables faster DNA amplification.
- **Low-volume samples:** Lab-on-a-chip systems only require a small amount of reagents for each analysis. Thus, it is possible to detect many illnesses without requiring large quantities of blood from patients.
- **High sensitivity:** Thanks to fast reactivity at the microscale, one can control in real-time the environment of a chemical reaction, leading to more controlled results.
- **Portability:** Due to their automation, and low energy consumption, lab-on-a-chip devices can be used in outdoor environments for air and water monitoring without the need for human intervention.

### Mycotoxins and Heavy Metal Detection: the whole system



The lab-on-Chip: (a) the whole system, (b) the array of photosensors and (c) the microfluidic engineered with the specific receptors

### Bacteria and Virus Detection by Nucleic Acid Amplification: the whole system

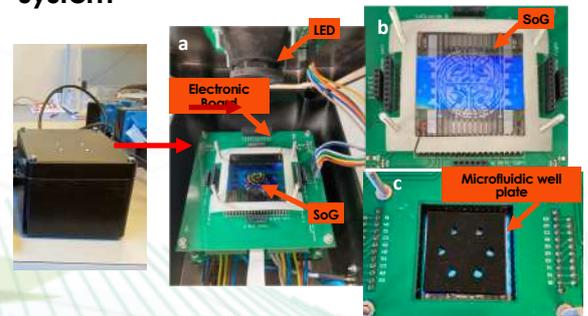
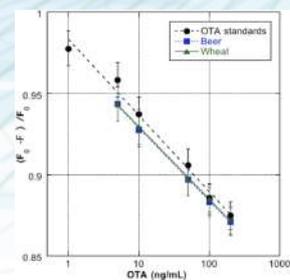
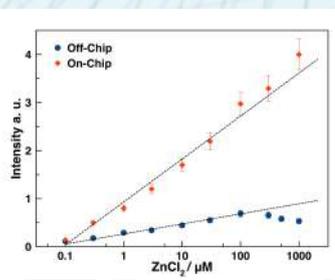


Image on the right: (a) metallic box containing the light-emitting diode (LED) anchored to the box lid, the electronic board and the **system-on-glass (SoG)**, (b) top view of the SoG containing photosensors, temperature sensors and the heater, and (c) microwell plate box lid, the electronic board and the SoG,

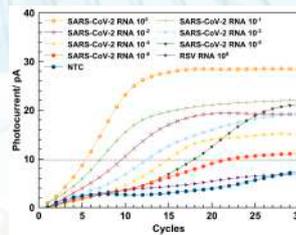
#### Detection of Mycotoxin



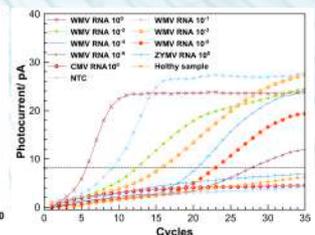
#### Detection of Zinc in water



#### Diagnosis of Covid



#### Diagnosis of a plant virus



**Fluorescent Label-Free Aptasensor Integrated in a Lab-on-Chip System for the Detection of Ochratoxin A in Beer and Wheat** . Costantini et al., ACS Appl. Bio Mater., 2019, 2(12), pp. 5880–5887.

**Biomolecular Monitoring Tool on Lab-on-Chip for Virus Detection**, Costantini et al. Biosensors 2023, 13, 2544