

# Compact, multimodal spectroscopic devices for the read-out of microfluidic organs-on-chip

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## Organisation

**Name of the organisation** Vrije Universiteit Brussel (VUB)

**Department** Faculty of Engineering

**Country** Belgium

**Geographical Area** Brussels Region

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Animal health, Human health
<b>The Method is situated in</b>	Basic Research, Translational - Applied Research
<b>Type of method</b>	In vitro - Ex vivo
<b>Specify the type of cells/tissues/organs</b>	Human cell lines

## DESCRIPTION

### Method keywords

DILI screening

photonics read-out units

multimodal method

fluorescence

Raman spectroscopy

### **Scientific area keywords**

free-form optics

fluorescence spectroscopy

Raman spectroscopy

lab-on-chip

### **Method description**

Recent improvements on the structural aspects of organ-on-chips pave the way towards a large-scale application. As such soon the number of read-out instruments that are in operation in parallel will need to drastically increase. Unfortunately, standard read-out equipment is bulky, complex and expensive. Therefore, our research activities concentrate on the introduction of a new paradigm topic to develop compact multimodal (spectroscopic) imaging units; namely polymer-based freeform optics. Although we apply a generic approach, the specific outputs within this proposal are units for DILI screening which record fluorescence as well as Raman signals.

### **Lab equipment**

Flow cytometer ;

Fluorescence microscope.

### **Method status**

Still in development

## **PROS, CONS & FUTURE POTENTIAL**

### **Advantages**

Standard read-out equipment is bulky, complex and expensive. One approach is to embed a organ-on-a-chip device in each well of a multi well plate and to perform the read-out with standard plate readers. Several of these products are already available. However, this approach does not allow a multimodal study of the sample and as such is not able to sense all DILI aspects at once. Therefore we follow a different approach and develop simplified, compact, low-cost, (more compact/less

expensive), multimodal (fluorescence and Raman signals) read-out units that enable the in-situ and real-time screening of organs-on-a-chip.

## **Challenges**

The interdisciplinary character of the topic.

## **Modifications**

Research is ongoing.

## **Future & Other applications**

The research is carried out in the framework of a FWO project where the focus is on the development of units for DILI screening. Though, we expect that due to the applied generic approach, the concept can be transferred to other applications with a potential impact on improving diagnostic and therapy options in the framework of a personalized healthcare.

## **REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION**

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