

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

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Organisation

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Department Faculty of Engineering

Country Belgium

Geographical Area Brussels Region

SCOPE OF THE METHOD

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