



# MIGRATE

**Miniaturized Gas flow foR Applications  
with enhanced Thermal Effects**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 643095

MIGRATE (Research and training network on **MI**niaturized **G**as flow fo**R** Applications with enhanced **T**hermal **E**ffects) is planned as a multi-partner Innovative Training Network (ETN – European Training Network), assessing research and applications for thermal aspects of gas microflows. The network consists of 10 beneficiaries and 7 associate partners, spread all over Europe. This unique combination of university research, SME and world leading industrial stakeholders will contribute in a synergetic way to the increase of knowledge about micro scale gas flow heat transfer problems as well as to industrial applications of highly efficient miniaturized devices. Within MIGRATE, a number of Early Stage Researcher (ESR) projects will cover different aspects of enhanced heat transfer and thermal effects in gases, spanning from modelling of heat transfer processes and devices, development and characterization of sensors and measurement systems for heat transfer in gas flows as well as thermally driven micro gas separators to micro-scale devices for enhanced and efficient heat recovery in automotive, aeronautics and energy generation.

The ESRs recruited for the network will undergo training in at least three different locations. Additionally, short stays can be arranged at beneficiaries and associate sites. Moreover, annual network wide workshops and summer schools will ensure that each researcher receives exposure to, and benefits from, the full expertise of the Network.

More information can be obtained from [www.migrate2015.eu](http://www.migrate2015.eu).

Within the MIGRATE network a

## **E S R Position (f / m)**

is offered at the University of Limerick / In Air Solutions with the topic

## **Interferometric and Colorimetric Based Sensing**

Ref. N°: MIGRATE-ESR 4

The position includes a secondment at

ASML, The Netherlands

Short stays at different other beneficiaries or associated may be possible by negotiation.

Main goal: development of miniaturized photoionization detectors for the measurement of volatile organic compounds (VOCs) at very low concentrations compatible with microfluidic flows

Duration: 3 years

Expected starting date: April 2016

Application deadline: **16<sup>th</sup> May 2016 or until filled**

**Support for housing, in terms of language courses etc. is provided by all participating organisations.**

**Application of women is highly appreciated!**



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## Detailed description of the project:

The development of ultra-portable, accurate and powerful analytical tools capable of monitoring the air pollutants in near real time is a major technical challenge. Among pollutants, Volatile Organic Compounds (VOCs) such as Benzene are of major concern for indoor air quality due to its ubiquity and carcinogenic effect. ICPEES and INR have jointly developed a miniaturized GC/PID system dedicated to BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) monitoring in near-real time conditions at ppb level. This system has a temporal resolution of 10 min, a detection limit of 0.5 ppb.

The objective of ESR 4 is to develop another type of microfluidic detector that can be complementary to In Air's mini-photoionization detector. For instance, colorimetric detection through a waveguide absorption cell or phase measurement interferometry could be very powerful either to confirm the presence of BTEX or to detect the presence of other VOCs. The new technology developed during this ESR project will be complementary to the development performed by ESR3, ESR8 and ESR9, aiming at producing a  $\mu$ -PID, a micro fluidic column and a  $\mu$ -pre-concentrator respectively.

The development of the microfluidic colorimetric device will be jointly performed at ULM and INR, while the test and validation will be conducted at INR. Supportive work will be performed at ASML, AMU and ICPEES.

## Expected time schedule

ESR n°4	Year 1										Year 2										Year 3									
		1 <sup>st</sup> stay										2 <sup>nd</sup> stay										3 <sup>rd</sup> Stay								
Location	ULIM										INR										ASML									

*1<sup>st</sup> stay:* At ULim the ESR will focus on local measurement approaches to concentration in microdevices, with particular emphasis on phase and colorimetric methods. Test platforms to quantify the suitability of techniques (accuracy, access and precision) will be developed.

*2<sup>nd</sup> stay:* At INR the ESR will integrate the evaluated approaches into a BTEX analyser and assess its performance using controlled reference BTEX concentrations in terms of detection limit, repeatability, and reproducibility. Additionally the robustness of the design will be assessed through a field campaign.

*3<sup>rd</sup> stay:* At ASML the new measuring approaches will be integrated with industrial application of chip making optical lithography of the semiconductor industry

In addition, a Short Visit (a few weeks) to ICPEES for analytical chemistry / diagnostic techniques in VOC detection training will be scheduled.



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## Requirements

This is a challenging and highly rewarding course of study and therefore the successful candidate will need to have the following qualifications:

### Essential Criteria

- Masters Qualification (NFQ Level 9, EQF Level 7) in Mechanical/Process/Chemical Engineering or related discipline
- Satisfy the Eligibility Requirements under H2020 for Early Stage Researchers (see <http://www.migrate2015.eu/24.php>)  
Strong background in fluid mechanics and heat transfer
- Experience with sensors, sensor systems and related control hardware/software

### Desirable Criteria

- Experience in microfluidics would be beneficial
- Good knowledge of imaging techniques (optics/cameras/image acquisition)
- Excellent communication skills and written/verbal knowledge of the English language
- High autonomy and adaptability skills
- Basic knowledge of French language (English will be the working language)

## Financial information / Salary

21 Months Contract will be provided at ULim, with a second contract of 15 months from In Air Solutions

Annual gross salary:

*At ULim €37903 inclusive of living and mobility allowances, subject to employer pension and PRSI deductions, in addition to personal income tax deductions, an additional mobility payment may be made due to status.*

## Contacts:

For further information please contact:

Dr. David Newport, University of Limerick, [david.newport@ul.ie](mailto:david.newport@ul.ie)

Dr Stéphanette Englaro (INR): [senglaro@inairsolutions.fr](mailto:senglaro@inairsolutions.fr)

Dr Stéphane Le Calvé (INR & ICPEES): [slecalve@unistra.fr](mailto:slecalve@unistra.fr)

Dr. Erik Arlemark (ASML) [erik.arlemark@asml.com](mailto:erik.arlemark@asml.com)



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## **Application procedure:**

Applications for this position **must** be made through the Vacancies Website of the University of Limerick, in accordance with the policies and procedures for the recruitment of staff.

[https://cloud.corehr.com/pls/ulliverecruit/erq\\_search\\_package.search\\_form?p\\_company=1&p\\_internal\\_external=E](https://cloud.corehr.com/pls/ulliverecruit/erq_search_package.search_form?p_company=1&p_internal_external=E)

Informal queries may be directed to Dr. David Newport ([david.newport@ul.ie](mailto:david.newport@ul.ie))

**Deadline: 16<sup>th</sup> May 2016**

Eligibility of your application can be checked here: [www.migrate2015.eu](http://www.migrate2015.eu)