

# LAB4MEMS II

## Micro-Optical MEMS, micro-mirrors and pico-projectors

### General description

According to the outcomes of the High Level Group on KET, the main driving force behind the development of future innovative goods and services will be Key Enabling Technologies (KETs), such as nanotechnology and nano-electronics including semiconductors. Mastering these technologies leads to play an important role in the R&D, innovation and cluster strategies of many industries, which are regarded as crucial for ensuring the competitiveness of European industries in today's knowledge economy. STMicroelectronics (Project Coordinator) is among the leading centers of excellence on "More Than Moore" technology identified at European level by the High Level Group on KET. Lab4MEMS II will feature the Pilot Line for innovative technologies on advanced Micro-Opto-Electro-Mechanical Systems (MOEMS).



### Goals / Objectives

- Lab4MEMS II will feature the Pilot Line for innovative technologies on advanced Micro-Opto-Electro-Mechanical Systems (MOEMS). It deals with MOEMS devices which involve sensing or manipulating optical signals on a very small size scale, using integrated mechanical, optical, and electrical systems to fabricate  $\mu$ -projectors, IR scanners and spectrometers actuated electrostatically or electromagnetically or piezo-electrically.
- The vision is to make Video "naturally augmented" through advanced MOEMS for pico-projection integrated with low-power electronics for applications in portable electronics (smart phones, tablets, laptops,...)
- $\mu$ -scanner platform targets for 3D infrared applications, with the introduction of innovative MOEMS micro-mirror technology to meet the long field of view projection at high incidence angle, highly reliable, small footprint, low-cost devices for consumer market.
- The near infrared micro-spectrometer will consist of three devices packaged in a hermetic or near-hermetic case: a thin film thermopile infrared detector, a scanning MEMS Fabry-Perot interferometer, a temperature sensor.

### Societal impact / Results

The diffusion of MOEMS will produce another breakthrough in the consumer market with their applications on portable and wearable electronics, where optical features can become of common use and also gas detection with NIR spectrometer. From the technological point of view these KETs open further possibilities in MOEMS process integration, optics, actuation source, driving and read-out controllers, and even in holographic field. The involved integration materials open further challenges requiring applicative optical study vs. radiation wavelength, reflectance, performances and reliability, whereas actuation will concern the definition and choice of the most suitable among electrostatic, electromagnetic and piezo-electric modes.



### Looking ahead

Lab4MEMS II paves the way to integrate and diffuse worldwide MOEMS technology in the consumer market. In that sense, from the technology and academic worlds big efforts are addressed towards ICT, IoT and material science. In ICT contactless command can become a reality in smart driving automotive applications and PC screen gesture recognition. Also the creation of small cell nets with optical wireless access based on such technologies could allow mobile operators to increase their capacity in high usage areas and in their coverage performances. Holographic imaging and vision are also becoming a reality thanks to the same based  $\mu$ -mirror technique.

### Partners

- STMicroelectronics srl (Coordinator)
- Politecnico di Torino
- Politecnico di Milano
- Consorzio Nazionale Interuniversitario per la Nanoelettronica IUNET
- CNR-IMM MDM
- Commissariat Al Energie Atomique Et Aux Energies Alternatives CEA
- ARKEMA SA
- University of Malta
- Okmetic OYJ
- Murata Electronics Oy
- VTT Memsfab Ltd.
- Teknologian tutkimuskeskus VTT OY
- Aalto University
- KLA-Tencor ICOS
- University POLITEHNICA of Bucharest – CSSNT
- Instytut Technologii Elektronowej, Warsaw
- Stiftelsen SINTEF
- Polewall AS
- Besi Austria GmbH

### Countries involved

- AUSTRIA
- BELGIUM
- FINLAND
- FRANCE
- ITALY
- MALTA
- NORWAY
- POLAND
- ROMANIA

### Additional information

Duration:	11.01.2014 – 10.31.2017
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Website:	<a href="http://www.Lab4MEMS2.ite.waw.pl">www.Lab4MEMS2.ite.waw.pl</a>
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