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Microsensors matrix for air quality control in human space missions habitable areas (SAFEAIR)

Project Coordinator: IMT Bucharest; Contact person: Dr. Eng. Ileana CERNICA, ileana.cernica@imt.ro;

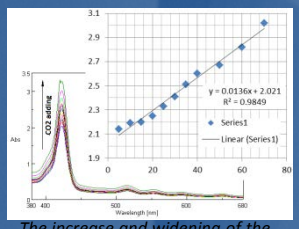
The **general strategic objective** is to participate to the fundamental formation of the space culture and the punctual strategic objective is to increase the research capability and the technological expertise of the consortium members in the field of sensors for space missions,microtechnologies (colorimetric gas sensors) and nanostructured materials (porphyrins).

From these strategic objectives, the main goal of the project SAFEAIR is derived: to achieve a colorimetric microsensors matrix, assembled in multichip module technologies for air quality control in space missions habitable areas (space stations and long distance spatial missions).

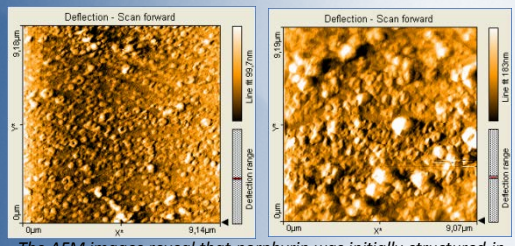
So, we intend to obtain a matrix made from colorimetric microsensors for a friendly detection of the air quality (i.e. detection of CO, NOx and high level of CO_2 and low level of O_2) **easy to be operated, freehands and detachable where the space habitants are.**

The important technological challenge will be the CO_2 detection (now there are only 2-3 research teams that can detect CO_2 using colorimetric microsensors) and for it we come with a new innovative technological solution based on a microfluidic device.

Preliminary experiments for CO_2 sensors based on porphyrins



The increase and widening of the Soret band of (PyTDMeOPP) porphyrin function of increasing amounts of CO_2.



The AFM images reveal that porphyrin was initially structured in ring aggregates (after 15 minutes) and that the most part of rings looks filled after CO2 absorption (80 minutes).

Consortium members:

- **National R&D Institute for Microtechnologie- IMT Bucharest;** Dr. Eng. Ileana Cernica
- **Institute of Chemistry Timisoara, Romanian Academy, ICT** Dr. Eugenia Lenuta M. Fagadar-Cosma (efagadar@yahoo.com, http://acad-icht.tm.edu.ro/)
- **European Business Inovation and Research Centre SA, EBIC**, Eng. Simion Dascalu (simiondascalu@gmail.ro)

November 2013 -February 2016

MICRO- CPVS Space Systems and Technology (MICRO-CPVS)

Project Coordinator: IMT Bucharest; Contact person: Dr. Elena Manea, elena.manea@imt.ro;

Project MICRO-CPVS is the short name of MICRO-CONCENTRATOR with Photo Voltaic Cell Systems for all space applications including an innovative design system architecture and system assembly based on the patented micro-technologies. This MICRO-CPVS© project proposal for space technology developments is set for Phase 1a (Q1-14) of joint AST and TASF joint industrial request to support the emergence of a key and promising technologies call on the improvements of the Next Generation European GEO telecommunication satellites competitiveness related to introduction and developments of the innovative technologies to support an increased performance efficiency by 15%, a mass reduction with 10%, increased reliability 15%, and cost savings of 20%.

Estimated results. The project will deliver entirely new solutions for the EU space industry in general, and particularly for the Romanian Aerospace Industry, a critical space technology that will improve actual European strategic agenda for non-dependence, having a major impact on the space industry production developments, over space mission operational costs, space solar cell power systems, space safety, increased life-cycle and space mission endurance for all kind of space services provide by satellite systems, ISS, robotic spacecraft systems, and during the future space exploration.

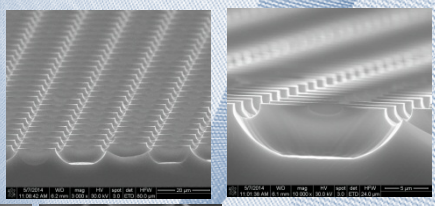
November 2013 -December 2015

Consortium members:

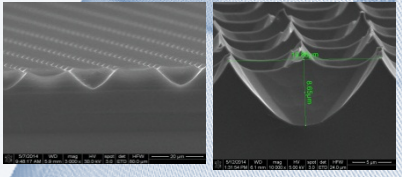
- **National R&D Institute for Microtechnologie- IMT Bucharest;** Dr. Elena Manea
- **European Business Inovation and Research Centre SA, EBIC**, Eng. Simion Dascalu (simiondascalu@gmail.ro). **Sub-Contracting organization**: Aerospace Industry: SC ROMAERO S.A.

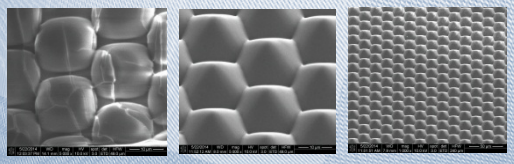
Preliminary results:

SEM images for type of mould obtained by isotropic etched of Si material



SEM images for type of mould obtained by isotropic and anisotropic etched of Si material combined





SEM images for microlenses of polymer obtained through replication with the above moulds

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