

Activities of the UPC-MNT group in space

Sensors

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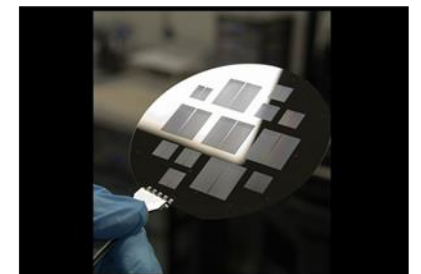
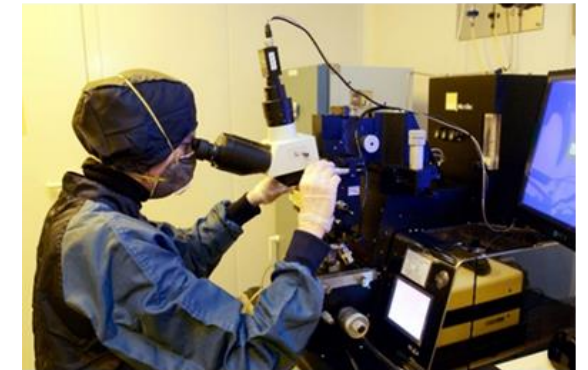
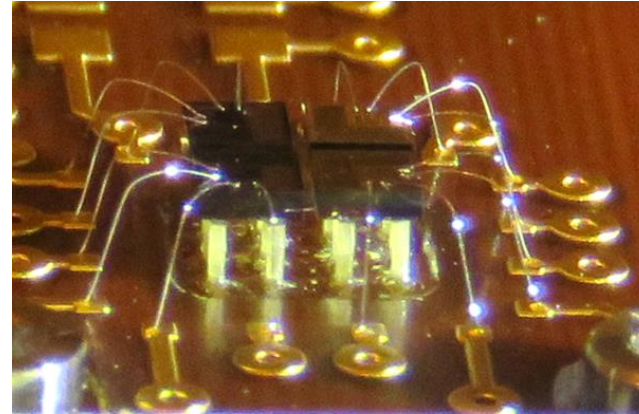
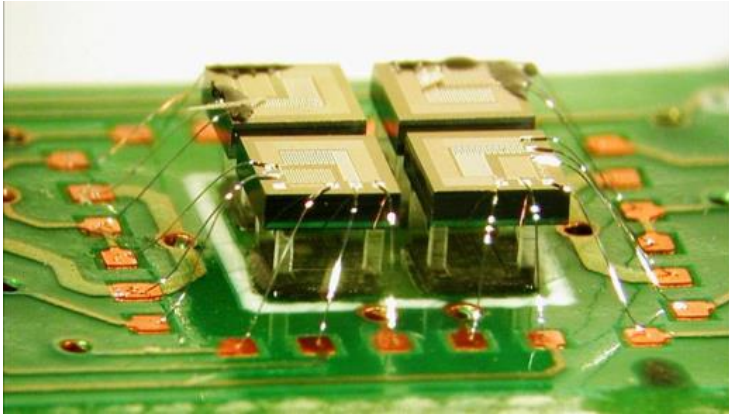
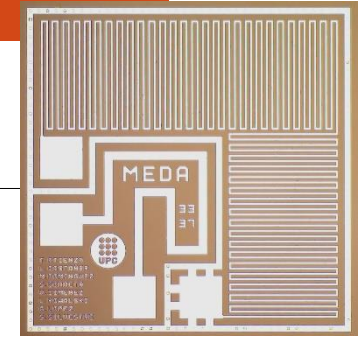
Pau Sindreu

Suresh Kumar

Dileep Kumar



MSL¹, InSight, Mars 2020²



- **Wind Sensors (led by INTA-CAB)**

- Each wind transducer:
 - 4 hot Si dice (2D sensitivity).
 - 1 cold Si die for temperature reference.

- Dice fabricated at the UPC Clean Room.
- **120 dice fabricated at UPC are in Mars (30+30+60)**

¹Planet. Space Sci., 56, 8, 1169-79 (2008).

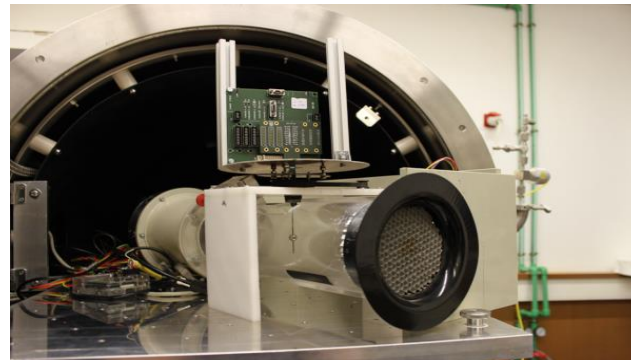
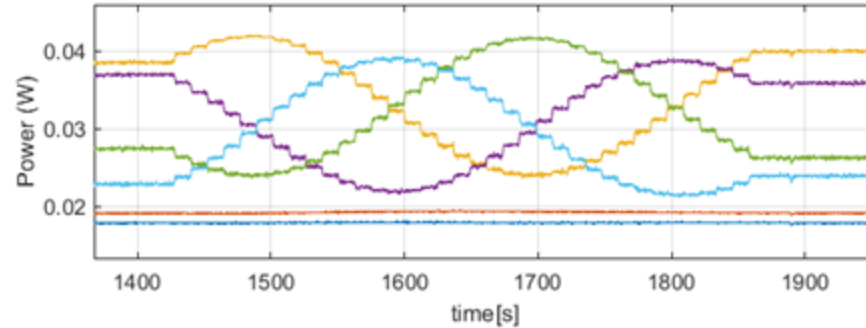
²Measurement, 239, 115427 (2025).

Next generation Spherical Wind Sensor



³IEEE Sens. J., 16, 1887-97 (2015).

Wind Sensor³



Miniaturized sensor

- 1 cm diameter spheres.
- Simple inverse algorithm.

Regolith Thermoprobe⁴



⁴Sens. Actuators, A 348, 114018 (2022)

Regolith thermoprobe

- Thermal conductivity and diffusivity.
- Tested with realistic Martian regolith (MMS-2)

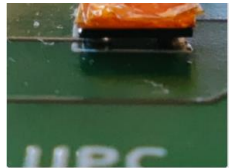
National Research Plan
PID2021-126719OB-C42, RTI2018-098728-B-C33,
ESP2016-79612-C3-2-R, ESP-2014-54256-C4-2-R
and PRODEX

MONITORING OF ATOMIC OXYGEN DEGRADATION PROCESSES IN VLEO MISSION



Program Discovery – OSIP Idea: VLEO -
New ideas for the nearest of outer space

May 2024 – Nov 2025

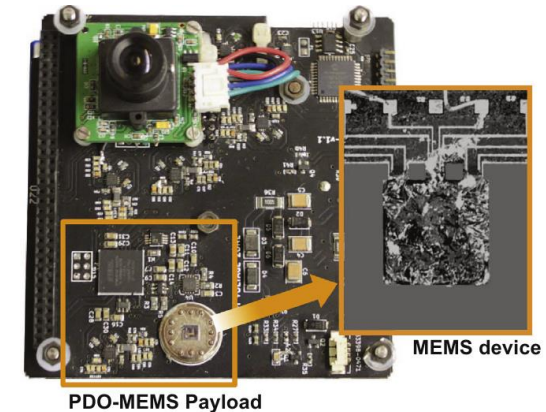


Long term monitoring of erosion processes in VLEO

- Sensor for the long term monitoring of atomic oxygen degradation processes of protective materials in VLEO.
- Testing at ESTEC LEOX Chamber.

Consortium formed by AVS and IMSE, led by UPC-IEEC.

Previous Payload for the ³Cat-1 mission ⁵
Launch date: Nov 29th 2018
MEMS sensor for detecting ATOX erosion of a
polymer.

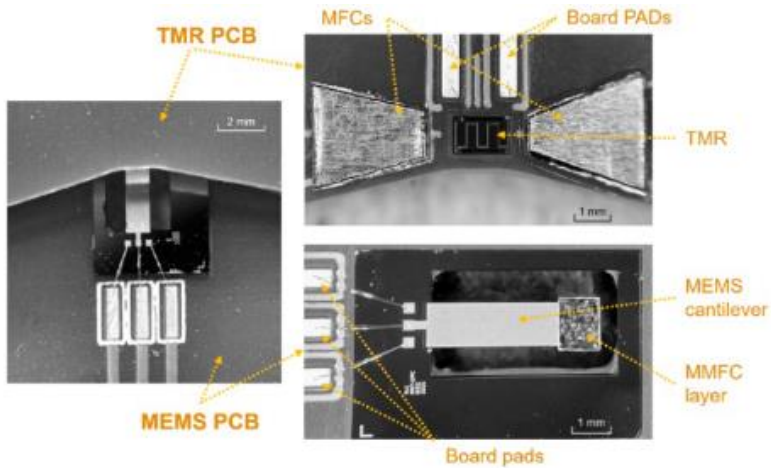


⁵Acta Astronaut. 126, 456 (2016)

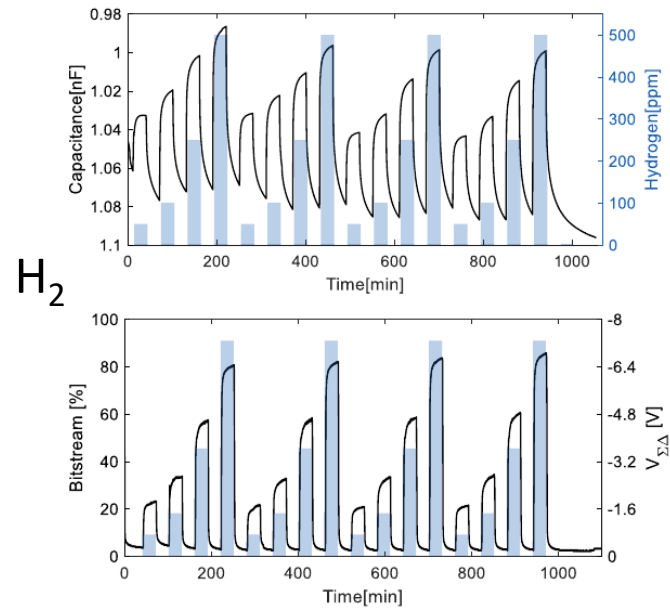
More sensors

In-orbit LISA Diagnostics Demonstrator – ILIADA
(led by ICE-IEEC)

MEMS magnetometer:
magnetic field modulation – MELISA⁶



Acceleration of gas sensors⁷
(with URV and NanoChronia)



Without control

With control

High frequency airflow sensors
(with Sener Aerospace)



Smart skin for airflow sensing

- Thermal microsensors.
- Aeroskin Project:
CPP2021-008740

⁶Measurement, vol. 230, 15 May. 2024, p. 114489 (2024).

⁷Sensors and Actuators B 426, 136959 (2025).

**We are actively looking for collaborations with
industry and other research institutions.**

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