*Press release*

# Electronic eye will improve inspections of aircraft fuselages

**Neuchâtel, 12 November 2021 – In SWISSMODICS, an EU-funded Clean Sky project coordinated by CSEM, engineers will develop an image sensor that can be incorporated into an aircraft's composite structure in order to detect damage and defects. The device will make aircraft inspections considerably easier, thereby avoiding the need for extended downtime or disassembly.**

Aircraft are inspected regularly, either during routine maintenance or after their structure has experienced an impact that may have been caused by ground support equipment at the airport gate, for example, or an in-flight collision with birds. But the damage caused by the impact doesn't always occur exactly where the structure was hit. That's especially true for aircraft made from composite materials, which are increasingly common because composites weigh less than conventional materials. "When a composite material is impacted, that creates a shock wave that propagates through the material and may cause damage – called delamination – at a point far away," says Pierre-François Rüedi, the CSEM expert who's heading up the project. "This makes the damage harder to detect."

A variety of methods are available for detecting delamination in composites. However, they involve inspections that require aircraft to be grounded for long periods of time or even disassembled – both of which are costly processes.

In an EU-funded Clean Sky H2020 project called SWISSMODICS, three partner organizations – CSEM, Jean Monnet University in Saint-Etienne, France, and Almay Technologies in Chauvigny, France, – will develop

a thin (<1 mm thick) broad-wavelength-spectrum image sensor that can be incorporated directly into an aircraft's composite structure in order to detect damage. This new technology could drastically shorten inspection times and reduce the inconvenience caused to both airlines and passengers, especially when planes must be grounded at the last minute for unplanned maintenance inspections.

**A camera sensitive to visible, X-ray and infrared wavelengths**

The new device will be designed to detect a broad spectrum of wavelengths: visible (i.e., what can be seen with the naked eye), X-ray (used in medical imaging, for example) and infrared (used most notably in thermal detection systems). Operators will therefore be able to choose from these three different ranges and select the one that's most effective for the type of damage they want to detect or the area they want to inspect. "In addition to helping aircraft owners avoid downtime and conduct more frequent, faster inspections, our technology will deliver a range of sensitivity that no other system currently out there can provide," says Rüedi.

**Sensitive layers optimized for specific wavelengths**

The sensor will include an electronic chip on which different types of sensitive layers have been deposited, each one capable of detecting a different wavelength. The exact composition of the layers will depend on the wavelength being targeted, but they will all have one thing in common: they will be made primarily from perovskite, a semiconducting material that's also used in solar cells. The light captured by the layers will then be processed by the chip.

CSEM will be in charge of developing the chip and studying the layer composition, in association with engineers at Jean Monnet University, who will characterize the components. Almay Technologies, which is specialized in composites for aeronautical applications, will test the new device on composite structures with defects. The project, scheduled to be completed in August 2023, should pave the way to the development of lighter aircraft, with all the environmental benefits that will bring.

**For more information**

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## About SWISSMODICS

SWISSMODICS has received funding from the Clean Sky Joint Undertaking under the European Union's Seventh Framework for Research, Technological Development and Demonstration Programme under grant agreement #887192. The Clean Sky Undertaking aims to anchor Europe's preeminent position in aviation by developing technology to reduce noise pollution and $CO_2$ emissions while promoting collaboration, competitiveness and global leadership. It serves as a prime example of the benefits made possible by public-private partnerships between the EU and the European aerospace industry. SWISSMODICS is scheduled to last 38 months (until the end of August 2023) and has received €923,172 in funding. The organizations involved in the project are Centre Suisse d'Électronique et de Microtechnique SA (CSEM) in Switzerland (the project coordinator), Almay Technologies in France, and Jean Monnet University in France.

## About CSEM

**CSEM—technologies that make the difference.**

CSEM is a Swiss research and development center active in the fields of precision microfabrication, digitalization, and renewable energy. CSEM builds up the ties between industry and academia. It supports companies as a hub of ingenuity, a center of technological excellence and innovation, and accelerator of the digital transformation.

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