

ABSTRACT PRESENTATION

Title: **COLOR SHADES®: a versatile Snapshot Multispectral Imaging Technology for a wide range of applications.**

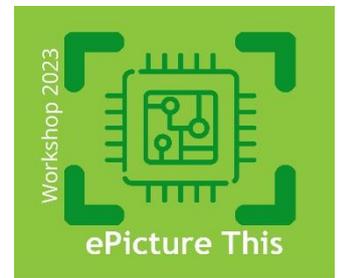
Presenter name: **Thierry Berthou**

Company name / Institute: **SILIOS TECHNOLOGIES**

Project name: **MultiSpectrApp**

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Abstract can be published on website: **YES** **NO**



an initiative by PENTA label projects
MANTIS and IMAGINATION with AENEAS support

Abstract:

Multi/hyper-spectral imaging becomes more and more used to detect, distinguish or measure different matters in a scene or on an object. Hyperspectral systems provide hypercube containing hundreds of spectral bands whereas Multispectral systems provide much lighter hypercube of less than 30 spectral bands (generally 4, 9, 16 or 25). The formers are well suited for R&D research but are expensive and complex to use. They are often used to defined the optimum restricted spectral data that are needed to solve efficiently the problem under investigation. Then multispectral systems acquiring only the useful data are then optimum to be deployed in terms of size, weight, power consumption, cost, ...

SILIOS technologies developed the COLOR SHADES® technology to offer affordable Snapshot Multispectral Cameras (SMC). The technology, based on the Bayer matrix principle, consist in hybridizing a pixelated multispectral filter onto an imager. Each pixel of the filter is associated to a pixel of the sensor. It is thus possible to design macropixel made of 2x2, 3x3, 4x4 pixels or any distribution to acquire in a single image capture 2, 4, 9, 16, ... different spectral sub-images.

The SILIOS SMCs shows the following features and advantages:

- ✓ The acquisition of both spatial and spectral data is Synchronous.
- ✓ The multispectral sensor has the same footprint than the monochrome imager used.
- ✓ Easy integration and use (like for monochrome/RGB imagers).
- ✓ Almost no restriction on the choice of the optical lenses.
- ✓ Thanks to the hybridization, the customization is possible even in very low volume.
- ✓ Low cost.
- ✓ Light hypercube (simpler and faster treatment, less computing power).

SILIOS proposes Series of off-the-shelf SMCs, with different raw spatial resolutions (VGA, 1.3Mpx, 4.2Mpx), different numbers of bands (8, 10, ...) in different spectral ranges (VIS, NIR, VIS+NIR, SWIR).

As mentioned, SILIOS proposes also any custom cameras.

The functionalities of the SMCs are related to materials composition analysis. Several cases can be distinguished:

- ✓ Detection of materials.
- ✓ Tracking of objects based on their composition.
- ✓ Distinction/separation of different materials.
- ✓ Measurement of the amount of compound in materials.

We present hereunder a few examples of applications using our SMCs:

- ✓ Agriculture: disease early detection (Apple scab, Esca in orchards/wine yards).
- ✓ Industry: additive manufacturing in line process monitoring.
- ✓ Waste sorting: garbage sorting (distinction of paper/carton/plastics).
- ✓ Defense: detection of hidden soldier, vehicles (decamouflage).



✓ New Space: mineral analysis for a lunar rover payload.

The COLOR SHADES® technology has been created in 2009 by SILIOS Technologies. The first products have been introduced on the market in 2016. Today several series of SMCs having different spatial resolution and covering different spectral ranges are commercially available (CMS, CMS4, TOUCAN, ANT). Over the past 8 years SILIOS developed also numbers of custom SMCs onto a large panel of imagers.

SILIOS aims now to develop new skills with partners for the use of the SMCs data in different domains and different use-cases. More particularly SILIOS is aiming to develop partnerships in the field of data treatment for different uses.

