



Spectral Imaging: End-user needs, Markets and Trends

Hyperspectral and multispectral cameras are becoming low cost tools to target on-field and in-line applications.

REPORT OUTLINE

- Title: Spectral Imaging: End-user needs, Market and trends
- PDF
- 200 + slides
- € 4 990 - Multi users license

KEY FEATURES OF THE REPORT

- Unique market revenue breakdown between multispectral and hyperspectral cameras
- Unique spectral cameras market forecast breakdown by spectral bands 2016-2022
- Spectral imaging cameras market forecast by applications 2016-2022
- Benchmarking of different spectral imaging technologies
- Analysis of most promising applications

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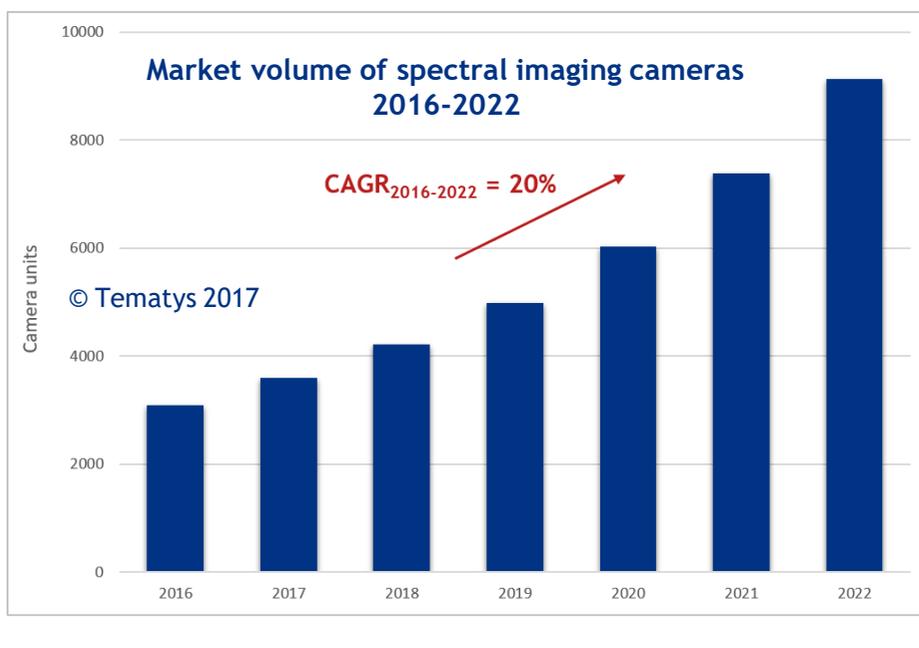
THE SPECTRAL IMAGING MARKET IS AT A TURNING POINT

First introduced for earth observation from satellites and planes, spectral imaging (including hyperspectral and multispectral imaging) was adopted in industry in the 2000's, for sorting applications. Sorting is currently the biggest market of multispectral and hyperspectral cameras, in revenue.

The adoption in other industrial or in on-field applications remained low for three main reasons: the high cost of cameras, their large size and the huge amount of data to process and store. Currently, the spectral imaging market is at a turning point in its evolution. Technical efforts have been made to build cameras at cost below \$10,000 and compact enough to be implemented on drones or in industrial lines. Meanwhile, robust and user-friendly methods for spectral data

analysis have been developed. These achievements will lead to a wider adoption of multi/hyperspectral cameras for on-field or in-line applications. The spectral imaging market is expected to experience an annual growth rate of around 20% in the coming years (CAGR₂₀₁₆₋₂₀₂₂), starting from around 3 600 cameras (excluding the Space and Military markets) sold in 2017 and increasing to more than 9 000 cameras sold in 2022.

The report provides the breakdown between multispectral and hyperspectral cameras. It also includes detailed market revenue and units forecasts by application and by spectral band from 2016 to 2022 and analysis by market segment.



NB: the space (satellite-based imaging) and the defense markets are not included in the market forecast because the amount and timescale of such programs is too different from classical markets.



A MARKET DRIVEN BY KEY SOCIETAL CHALLENGES

With its ability to combine spatial and chemical information, spectral imaging addresses 3 major industrial and societal challenges:

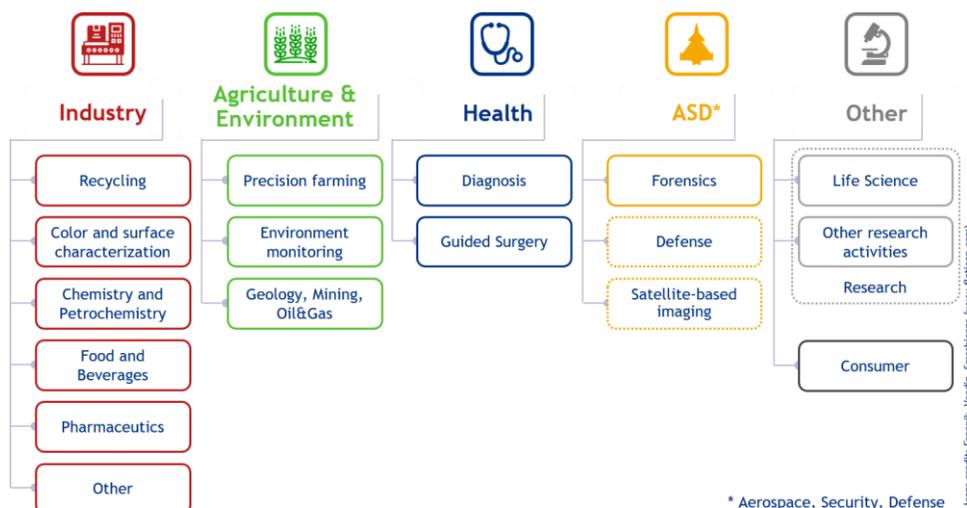
- The deployment of industry 4.0, which induces a high demand for cost-effective smart sensors able to provide complex measurements,
- The need for sustainable and safe food production, which requires measurements on large areas and at high throughput to provide high food quality for an ever growing population,
- The development of personalized healthcare, that implies the need of label-free, non invasive and compact tools, giving a fast and reliable diagnosis.

analysis will drive the adoption of hyperspectral and multispectral cameras into on-field and in-line applications. Markets that will experience a high growth are Food & Beverages, Precision Agriculture, Color and Surface Characterization, Gas sensing, Pharmaceuticals QA/QC, and Medical applications in the long-term.

In this report, we provide a detailed analysis of current and most promising applications of spectral imaging cameras. We describe the end-users needs and the remaining challenge for their widespread adoption in these markets.

These demands for low cost advanced

Segmentation of spectral imaging applications



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TECHNOLOGY DEVELOPMENTS MEET THE DEMAND FOR LOW COST ADVANCED ANALYSIS

In on-field and industrial applications, the demand for low cost portable and easy-to-use systems is high. Technological breakthroughs are undertaken at hardware and software levels to decrease cost and size of spectral imaging cameras and simplify the data processing methods.

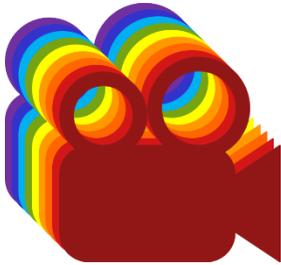
of filters on CMOS detectors at wafer level or innovative designs of cameras integrating multiple detector arrays. With these technologies, cameras currently reach cost of \$5 000 to \$12 000. Further progresses are necessary to achieve the target price of \$1 000 to \$5 000 for broad adoption on field or in industry.

Recent advances take advantage of innovative technologies like deposition

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But the value of a system based on spectral imaging also lies in its ability to provide relevant information to the end-user.

The development of robust and user-oriented data processing solutions is critical for the growth of the spectral imaging market.

This report compares the current and emerging spectral imaging technologies (pushbroom camera with grating or prism, filter arrays, tunable filters, interferometers, etc.) and highlights challenges of spectral imaging data processing. It provides company profiles of main and promising hyperspectral and multispectral camera manufacturers.

AUTHORS

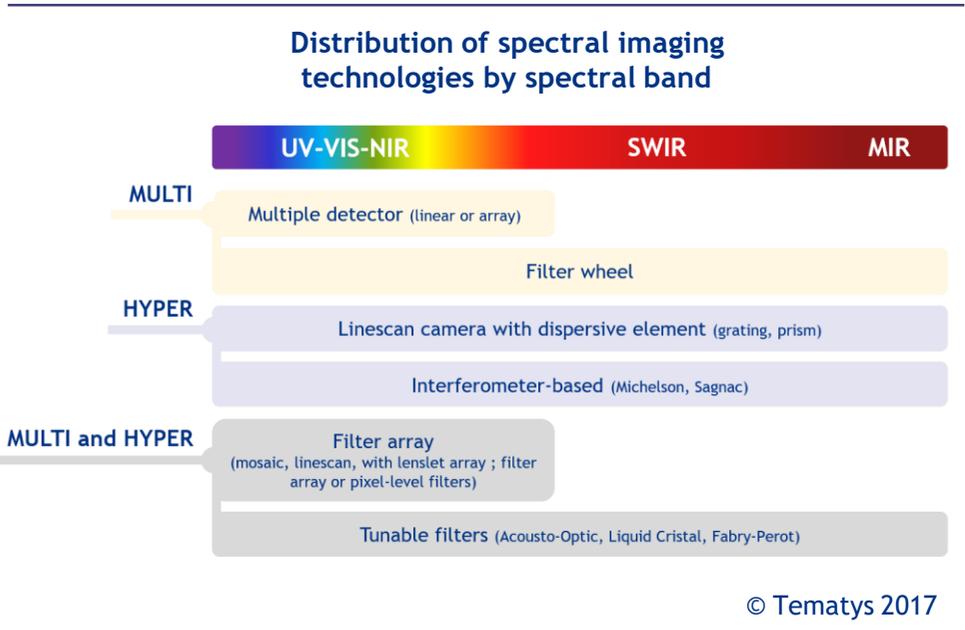


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She manages the production of several study reports on the market and trends of Photonics technologies.

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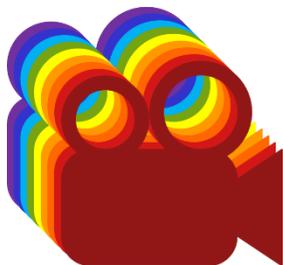
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OBJECTIVES OF THE REPORT

- Underline how spectral imaging can address key economical and societal challenges,
- Provide market data and forecast of spectral imaging cameras by application and by spectral band,
- Describe and benchmark the numerous hyperspectral and multispectral available technologies,
- Identify the most promising applications of hyperspectral and multispectral cameras,
- Highlight the importance of data processing in the development of the spectral imaging market,
- Understand end-users requirements for each Application, and the challenges to overcome for a wider adoption of spectral imaging.

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Thierry Robin has run more than 50 projects in Photonics with major players in diverse sectors: defense and security, medical optics, material science, industry... Cofounder of TEMATYS, he is an expert in optical devices, components and systems.

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Benoît d'Humières is an expert in Optics, Electronics and Instrumentation for industrial and research applications.

He has run many marketing and technological studies for major companies (THALES, ESSILOR, EDF...) and Research institutions

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