

## Spectral Imaging: End-user needs, Markets and Trends

### *Release announcement*

TEMATYS is pleased to announce the release of its new market and technology report "Spectral Imaging: End-user needs, Markets and Trends".

*Sale price: 4.990,00 € HT*

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

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.

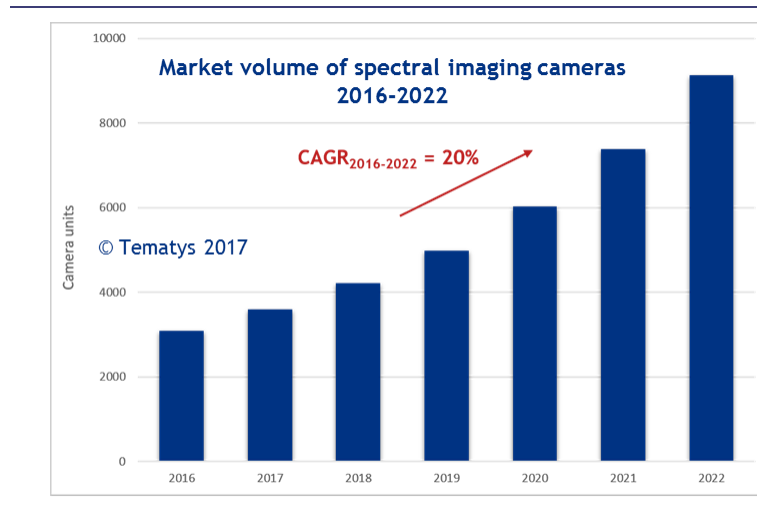


Figure 1. Market volume of spectral imaging cameras 2016-2022.

*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.*

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, which implies the need of label-free, non-invasive and compact tools, giving a fast and reliable diagnosis.

These demands for low cost advanced 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.

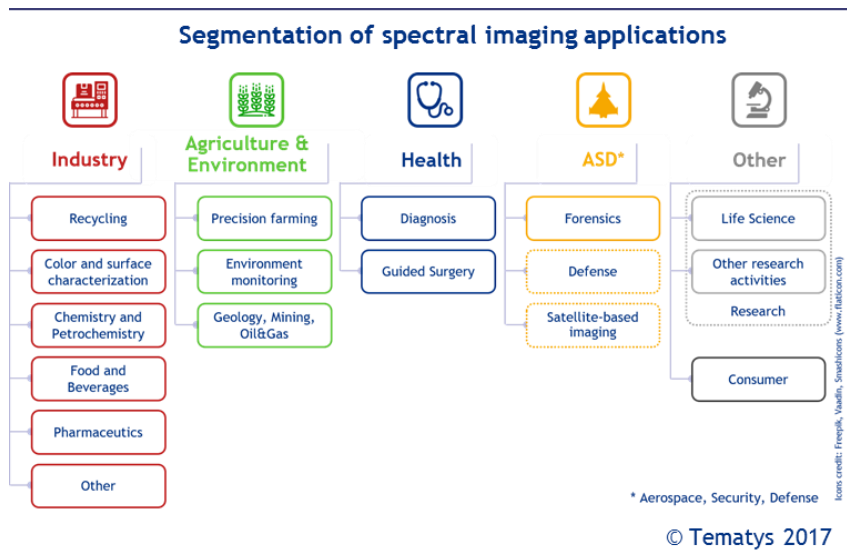


Figure 2. Segmentation of spectral imaging applications

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.

Recent advances take advantage of innovative technologies like deposition 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

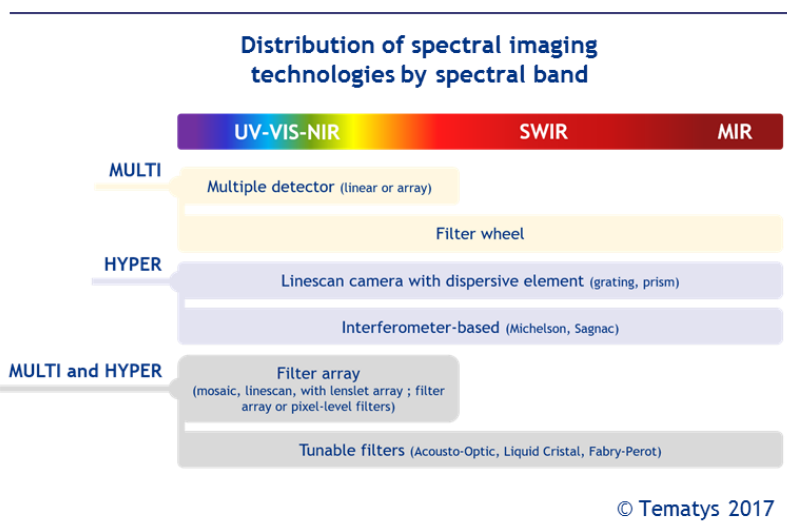


Figure 3. Distribution of spectral imaging technologies by spectral band

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.

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TEMATYS is independent. Our team of highly qualified consultants is committed to provide a very comprehensive understanding on trends, markets and use of photonic technologies and their applications. Our services:

**➔ Reports**

- Market research
- Technological benchmark
- Prospective studies

**➔ Market studies & strategy**

- Market studies
- Market entry strategy & roadmaps
- Diversification
- Pre-commercial prospection

**➔ Technology transfer & Research valorization**

- Marketing & exploitation of Research results
- Collaborative research consortia set-up
- Technology transfer strategy

**➔ Product features definition**

- User needs - Market Requirements Document (MRD)
- Product Requirements Document (PRD)
- Feasibility studies
- Sourcing & technology assessment

Our main clients are companies of any size, from international groups to SMEs and start-up. We have also developed a special expertise in technology transfer and R&D valorization dedicated to Research Organizations and Laboratories, and we provide strategic views on optics and photonics markets for publics for clusters and public agencies.

## Previous reports:

	Spectral Imaging: End-users needs, Market and Trends	2017
	Photoacoustic Imaging: Technology, Systems, Market and Trends	2017
	Miniature and Micro spectrometers: End-users needs, Market and Trends	2016
	Terahertz Components & Systems, Technology and Market Trends (Update of the Report released in 2013)	2016
	Cascade Laser Components & Systems: Technology and Market trends	2015
	Infrared Imaging Photodetectors and Systems: Technology and Market Trends	2015
	Photonics Technologies for ADAS in the Automotive Industry	2015