



Introduction to NIR Spectroscopy

2020 | Regensburg
Light is OSRAM

OSRAM
Opto Semiconductors

Megatrend of “well-being”: Consumers want to know what’s in their food

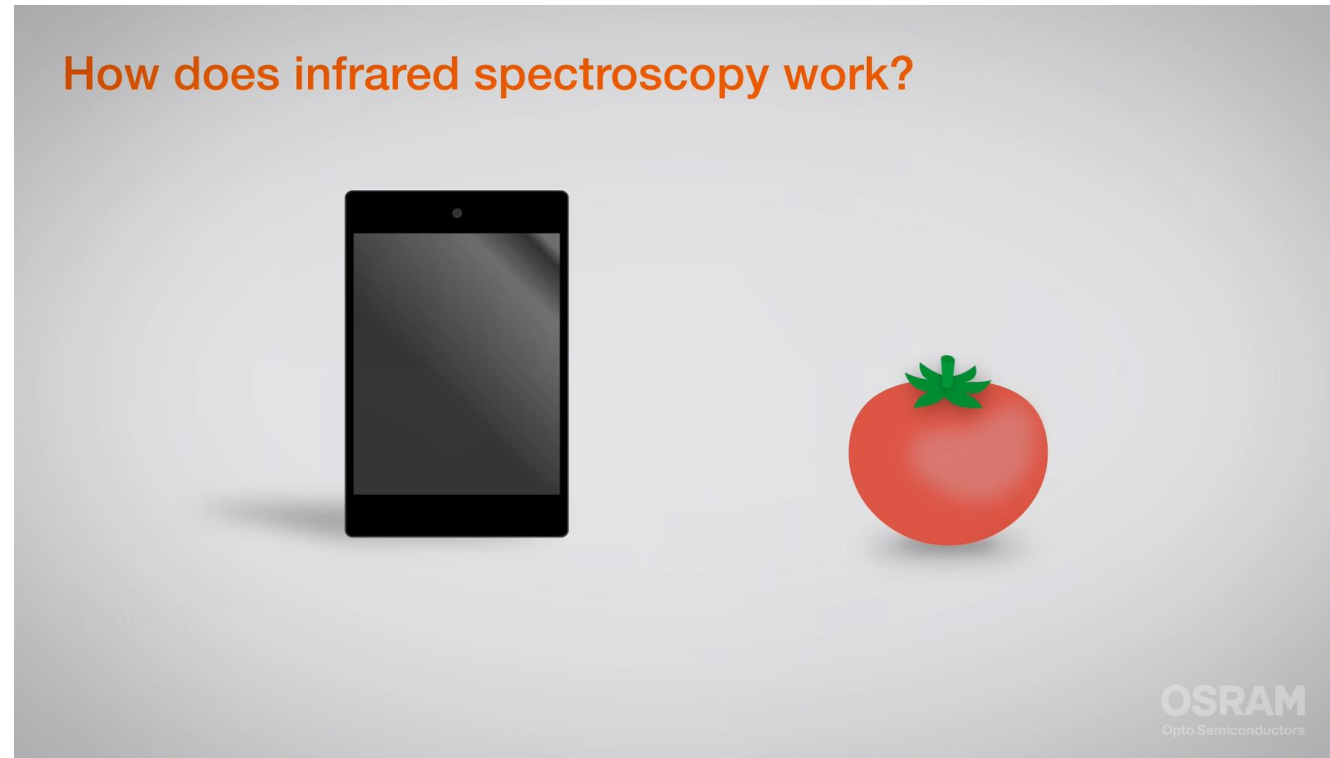


**Mobile
spectroscopy
required!**

» New feature to **differentiate your application** from others!

OSRAM OS as technology leader for innovative light sources

Spectroscopy enables material identification with the creation of a wavelength fingerprint

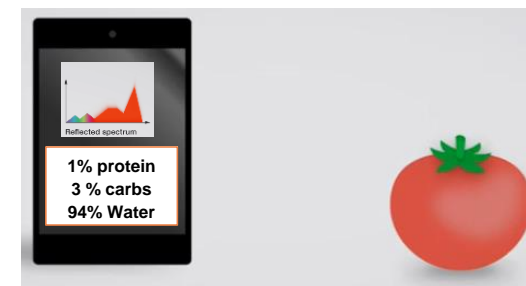
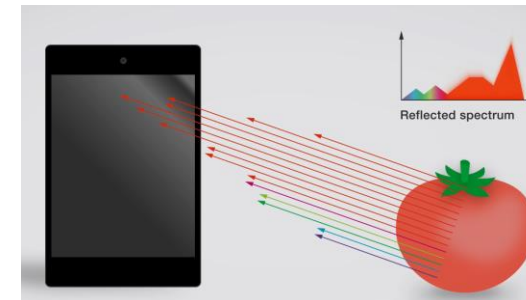
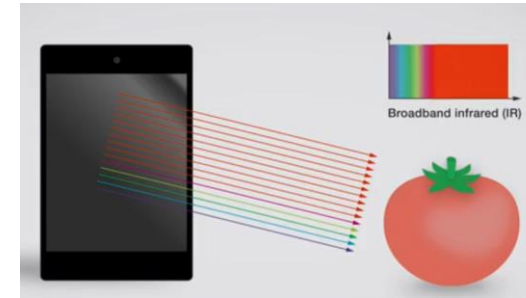


<https://www.osram.com/os/applications/mobile-competence/mobile-competence-spectroscopy.jsp>

Spectroscopy enables material identification with the creation of a wavelength fingerprint

How does it work?

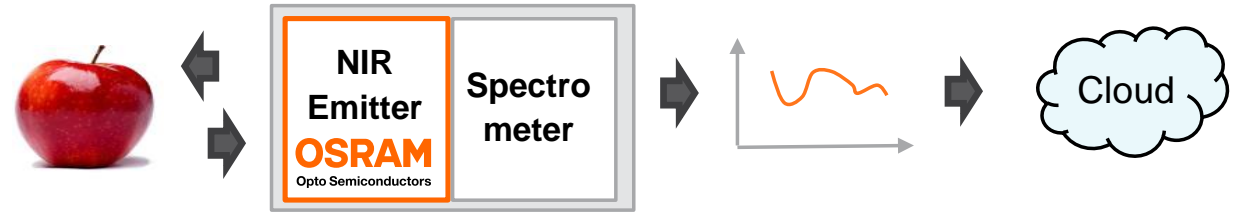
- 1 Shine **NIR^{1.)} broadband light** towards the object – the broader the spectrum the more substances can be measured
- 2 Some light gets reflected and some light gets absorbed specific to the substance → **Molecular fingerprint**
- 3 The reflected light is analyzed and reveals information about the composition



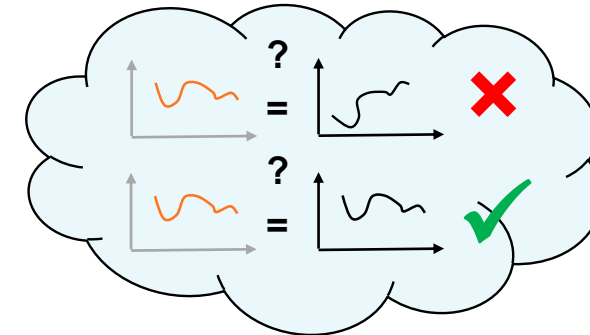
1.) Near infrared

Spectroscopy enables material identification with the creation of a wavelength fingerprint – Comparison with models important

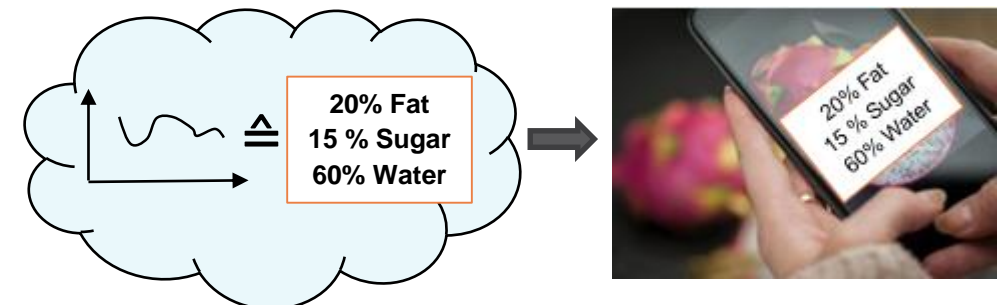
1. Send reflection (or absorbance) spectrum of measured object to cloud



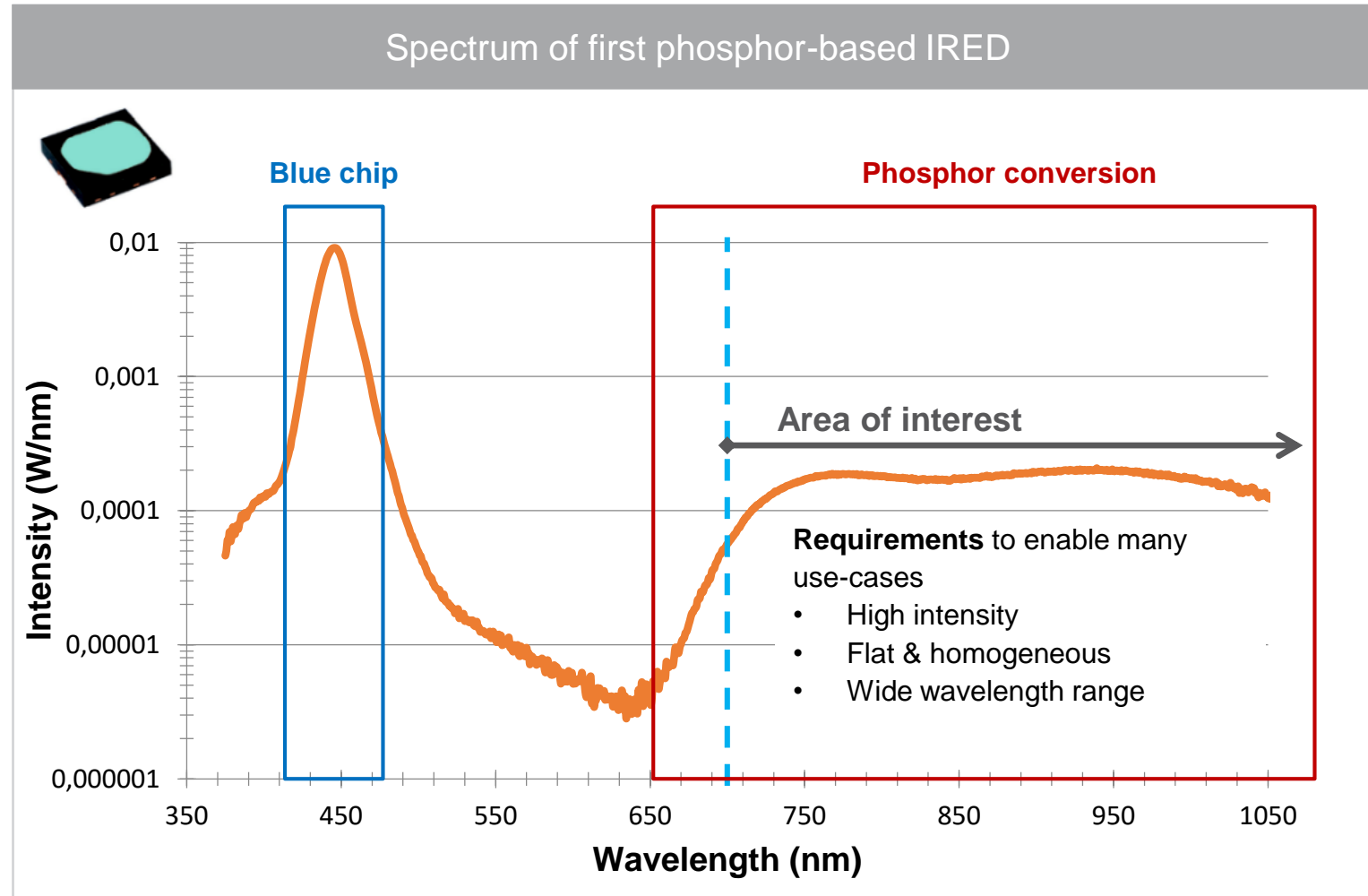
2. Comparison of absorbance/reflection spectrum with known spectra in database



3. Identified values of matching spectrum is sent to user interface



IR broadband emitter can be realized best with phosphors – This innovative solution was introduced first by OS and honored with awards



Excerpt of received awards

Elektronik Magazine
„Product of the year 2017“



Edison Award
Finalist

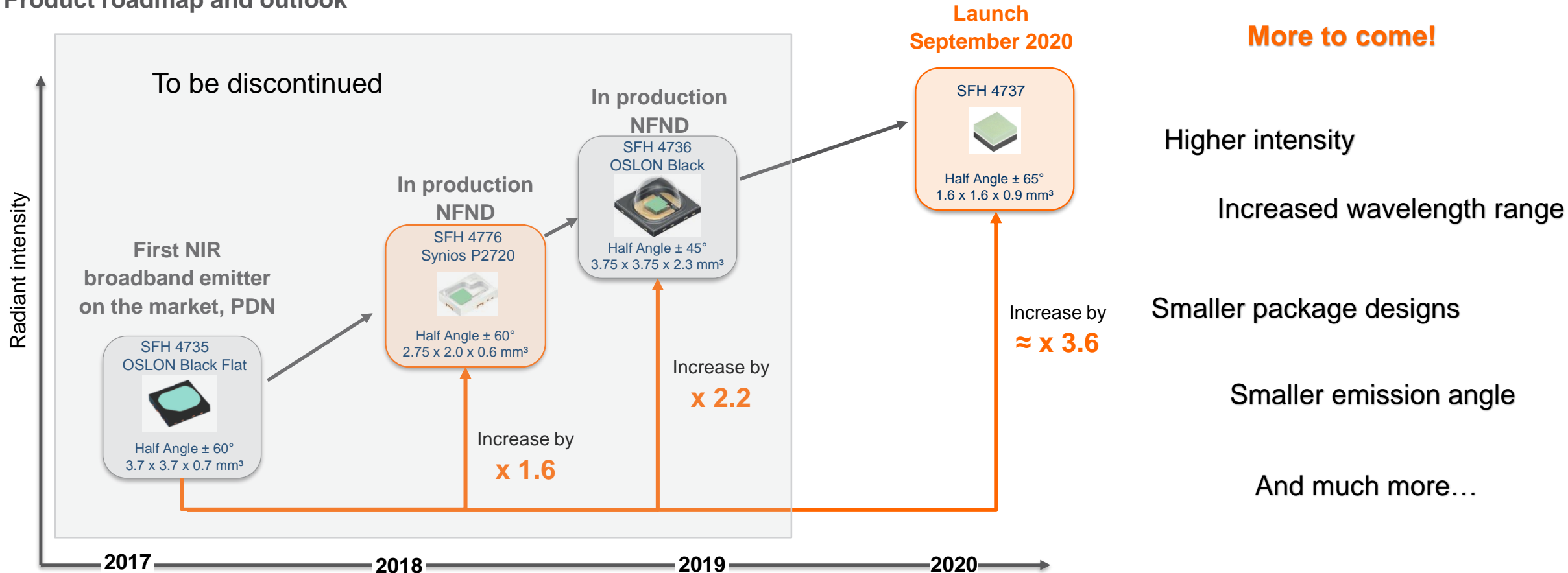
EE Times Ace Awards
Finalists

SPIE Photonics West 2018
Prism Awards



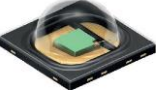


NIR Spectroscopy is just at the beginning – there will be much, much more...

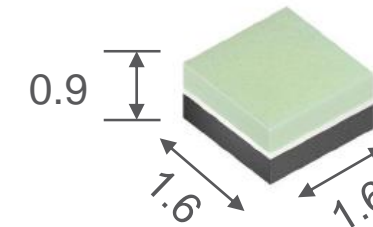
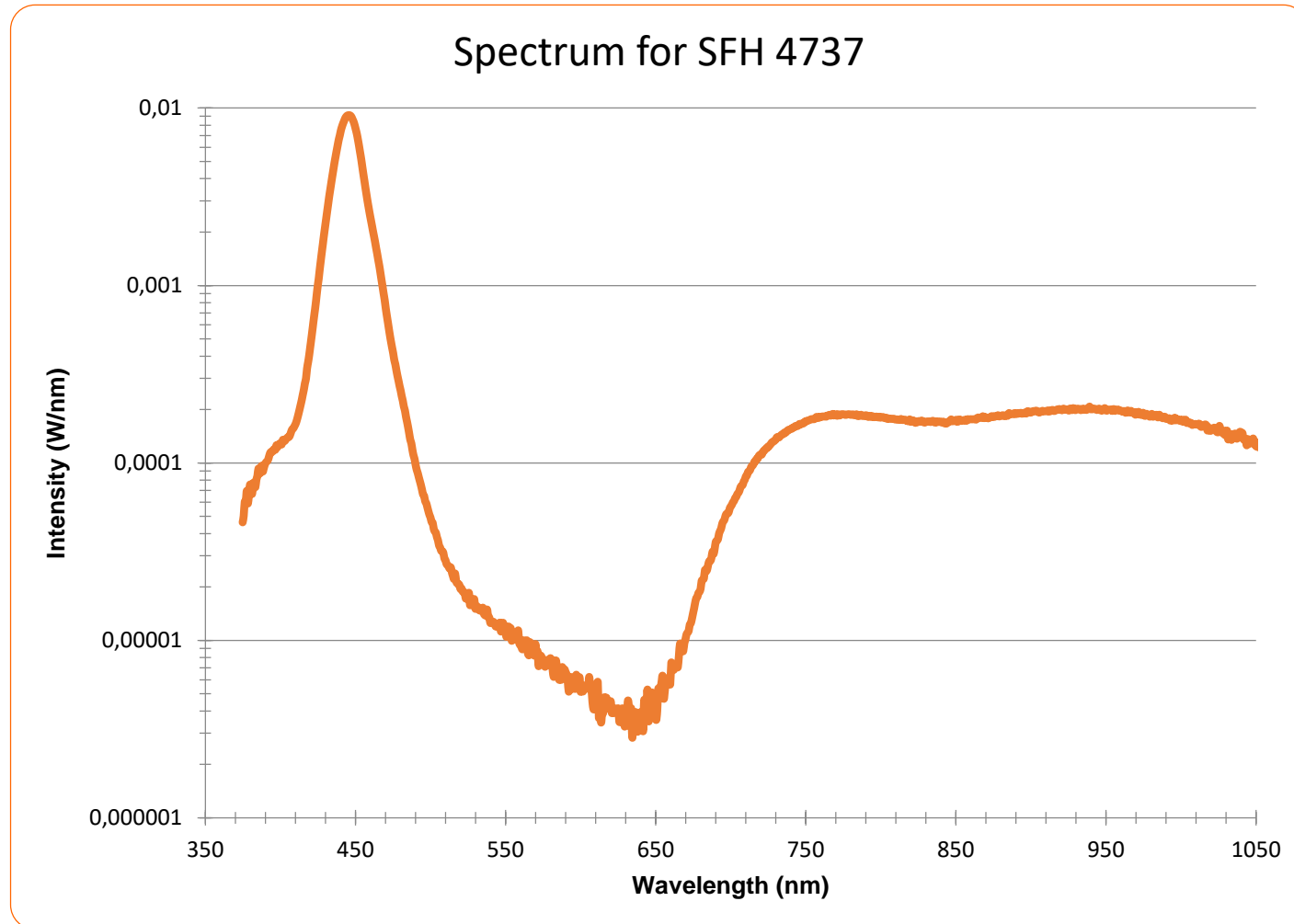
Product roadmap and outlook



NIR Spectroscopy is just at the beginning – there will be much, much more...

Product portfolio	NFND	NEW Product	NFND
	SFH 4776 SYNIO S Package 	SFH 4737 OSLON P1616 	SFH 4736 OSLON Black 
Dimensions / Package	2.75 x 2.0 x 0.6 mm ²	1.6 x 1.6 x 0.9 mm ³	3.75 x 3.75 x 2.3 mm ³
Halfangle	± 60°	± 65°	± 40°
Total radiant flux in NIR <small>(650 nm – 1050 nm, at 350mA)</small>	24 mW	74 mW	23 mW
Radiant intensity in NIR <small>(650 nm – 1050 nm, at 350mA)</small>	8 mW/sr	18 mW/sr	11 mW/sr
Comments	<ul style="list-style-type: none"> • Small dimensions • Improved phosphor material • Robust package 	<ul style="list-style-type: none"> • Smallest dimensions • Latest phosphor material • Robust package 	<ul style="list-style-type: none"> • Optics included • Improved phosphor material • Established package design

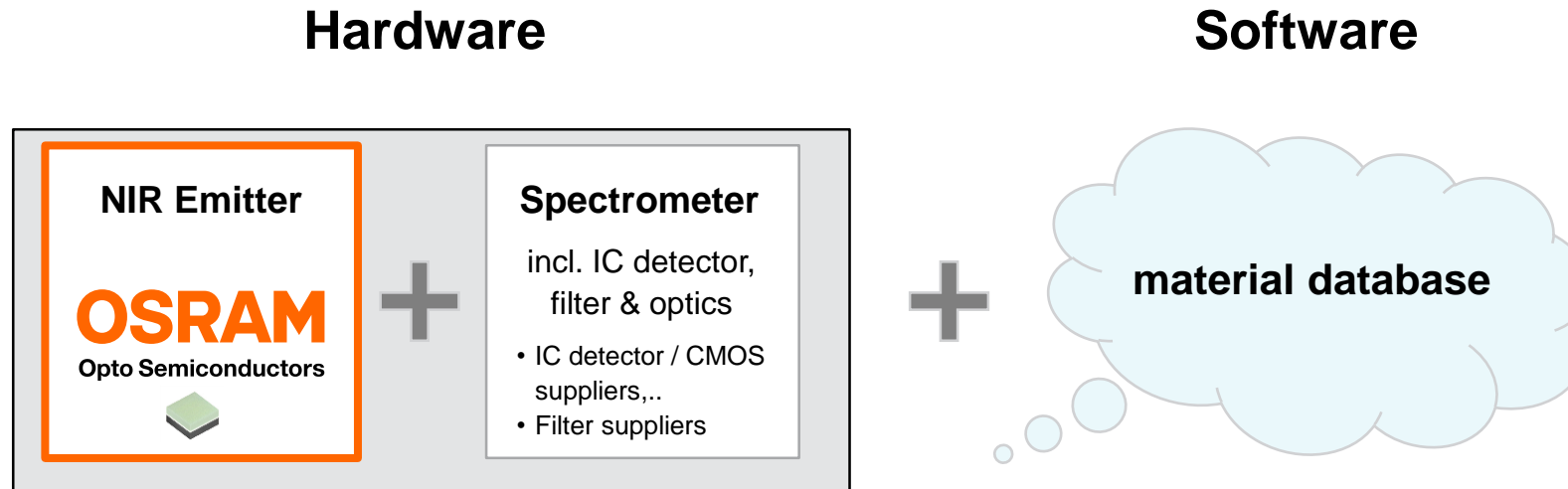
Phosphor conversion to the infrared spectral range – Enabling technology for mobile spectroscopy



OSRAM OS SFH 4737	
Max forward current $I_{f,max}$	500 mA (DC operation)
Spectral flux at $I_f = 350$ mA	
Total radiant flux (650nm -1050nm)	74 mW
$\lambda = 750$ nm	210 μ W/nm
$\lambda = 850$ nm	210 μ W/nm
$\lambda = 950$ nm	240 μ W/nm

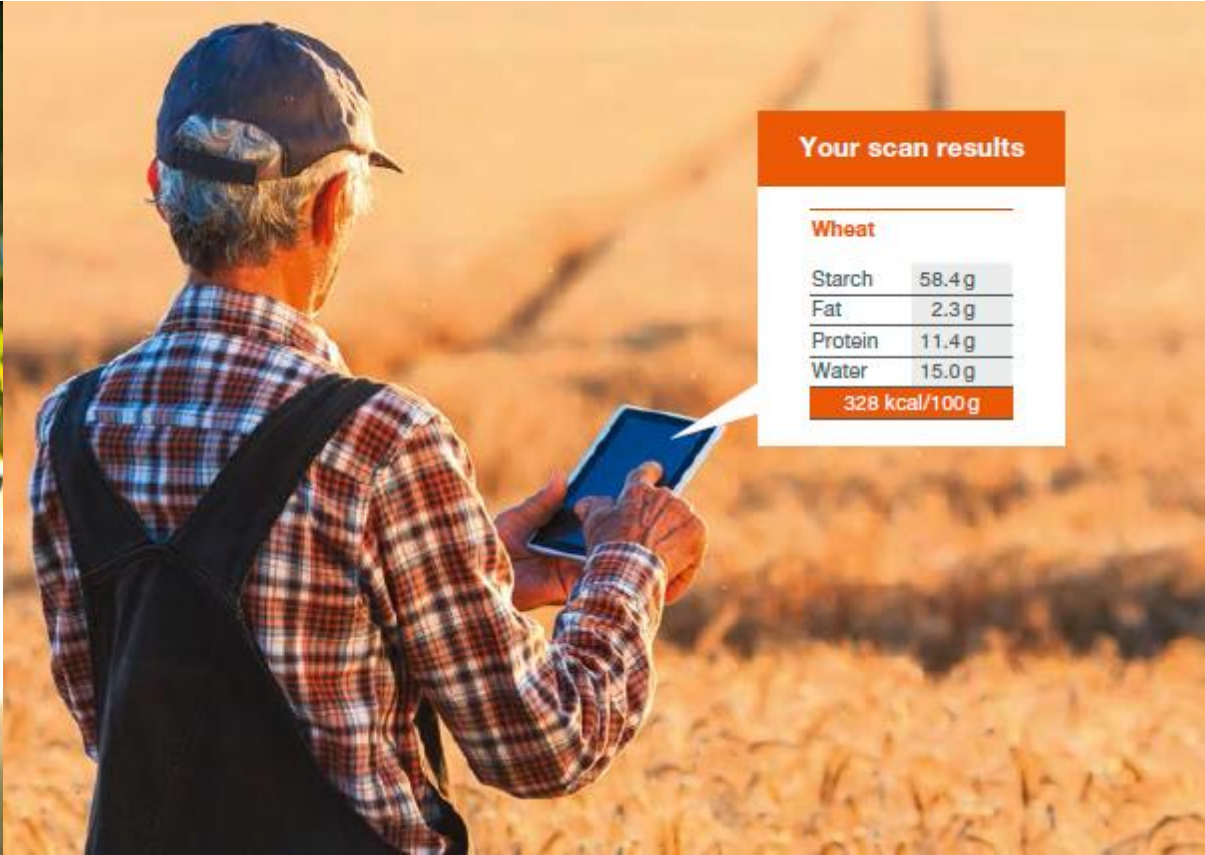
NIR Spectroscopy ecosystem consists of 3 main parts: NIR-Emitter – Spectrometer – Software

Key building blocks in the Spectroscopy ecosystem



- OSRAM can support with application know-how and is **#1 in NIR emitters**
- OSRAMs knowledge, network and partnerships help to **accelerate** the application **development**

Typical use cases



There is no limit for creativity – new applications can be developed to improve consumers life by mobile spectroscopy

Hyperspectral imaging

- Food industry (monitor food quality)



Picture from <https://hippocratesmedreview.org/applications-of-hyperspectral-imaging-for-food-quality-analysis>

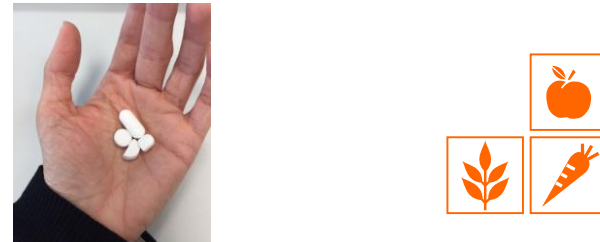
Bill validation

- Find out currency and amount
- Counterfeit check



Identify counterfeit pills

- Check if pills contain labeled substance
- Identify substance in pills



Agriculture

- Define optimal time for harvesting
- Monitor product quality



Mobile spectroscopy to differentiate **your product from others!**

The world's first infrared spectroscopy lab: Empower consumers to check what is in their food

Enabled by OSRAM's broadband infrared LEDs



→ Spectroscopy as new feature to **differentiate your application** from others!

Vision for future spectroscopy:

- Portable
- Affordable
- Easy to use by anyone
- Non-invasive



**We are happy to talk to you about your requirements –
bring the power of spectroscopy to everybody!**



Thank you!



Thank you!