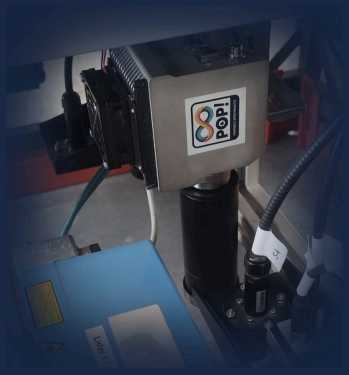
SORTING · RECYCLING · MATERIALS RECOVERY

PRO-PIX

PHOTONICS OPEN PROJECTS



FROM MEASUREMENT TO DECISION

CAPABILITY
VIS/NIR and SWIR measurement, object by object

MEASUREMENT
A spectral signature and the image of the object measured

USE
Feedstock qualification, purity control, materials R&D

DECISION
Accept, reject or re-grade a batch

BEFORE / AFTER

Sorting by look and colour	→ **Identification by spectral signature**
Sample sent to the laboratory	→ **Measurement on site, on the object**
Deferred result	→ **Data available at the moment of the check**
Fixed instrument	→ **Reconfigurable spectral range and resolution**

CAN SPECTRAL IMAGING DISTINGUISH YOUR MATERIALS?

Find out before you invest. We test your own samples in a feasibility study to determine what spectral imaging can deliver for your application.

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When colour and texture are no longer enough to tell what an object is made of.

"VIS/NIR and SWIR spectral measurement, object by object, to characterise your streams and qualify your batches beyond appearance."

1 CURRENT LIMITATIONS

- **Today, two materials that look alike pass for identical.** Colour and shape say nothing about composition.
  Batch purity rests on the operator's eye, and errors surface downstream.
- **Feedstock qualification relies on manual sampling.** A few handfuls decide the fate of an entire stream.
  The decision to run a stream through the process is taken without measured evidence.
- **Purity checks happen after the fact, in the laboratory.** The result arrives after the batch has shipped.
  Recovered value is negotiated with no figures to show.

2 ADDRESSED MEASUREMENT

1 OBSERVATION
The scene (bin, conveyor, sorting line), through a built-in 1080 px RGB camera.

2 SEGMENTATION AND MEASUREMENT
A segmentation model isolates the objects; the spectrometer measures each cluster in VIS/NIR or SWIR.

3 RESULT
One signature per object, matched on board against your spectral library: the sensor returns a material class.

3 PRIORITY APPLICATIONS

QUALIFYING AN INCOMING FEEDSTOCK

SITUATION Goods-in: a representative sample presented to the sensor.
MEASURED Spectral measurement object by object, in SWIR 900-2500 nm.
RESULT A measured breakdown of the material families present.

Decide whether to run the stream, on the strength of figures.

PURITY CONTROL ON SORTED OUTPUT

SITUATION Fixed station or area monitoring, on the fractions produced.
MEASURED Spot checks, every object measured and imaged.
RESULT A measured contamination rate, documented by the images.

Put batch quality on an objective footing at the point of sale.

DEVELOPING A SPECTRAL SIGNATURE

SITUATION Ahead of a project: building a reference set on your own materials.
MEASURED Acquisitions between 400 and 2500 nm as required, at adjusted resolution.
RESULT A spectral library and a discrimination model.

A method that belongs to you, which can then be embedded in the sensor.

MONITORING A STREAM AREA

SITUATION Conveyor, bin or sorting line, at 1.5 m and beyond.
MEASURED Repeated spectral measurement on the segmented zones of interest.
RESULT A record of composition over time, with no intervention in the stream.

Track a drift in feedstock and document when it appears.

WHAT CHANGES

01 ON-BOARD ANALYSIS
A material class assigned to the object as it passes.

02 SWIR READING
Measurement covers bands that lie outside the visible range.

03 DOCUMENTED DATA
Every spectrum is tied to an object and to its image.

04 ADJUSTABLE RESOLUTION
From 0.06 to 20 nm: you trade discrimination against rate.

TECHNOLOGY LICENSED FROM ARVALIS / PHOTONICS BRETAGNE

SPEC. PRO-PIX

SORTING · RECYCLING · MATERIALS RECOVERY

- **Your on-board algorithms remain your property**
- **Method proven on ONE-PIX, transferred to PRO-PIX**
- **OEM white-label integration**
- **Designed and made in France, in Lannion**

SPECIFICATIONS

SPECIFICATION	PRO-PIX VIS/NIR	PRO-PIX SWIR
Typical spectral range*	400-1000 nm *The range is chosen to suit the spectral question.*	900-2500 nm
Spectral resolution*	0.5 nm typical (0.06 to 20 nm depending on configuration) *The finer the resolution, the better the discrimination and the longer the integration time.*	
Built-in RGB camera	1080 px, segmentation and colour reference	
Measurement and analysis rate**	4 to 10 Hz at best *Segmentation, measurement and analysis included: this is the rate at which usable data leaves the sensor.*	
Typical working distance / FOV	1.5 m to infinity / 25°	
Triggering / Connectivity	Hardware and software triggers / GigE	
Control software	Graphical interface / Python SDK / ROS	
Dimensions / Weight***	125 × 90 × 90 mm / < 700 g	
Ingress protection / Temperature	IP65, complete system / 0-40 °C	

* depending on the spectrometer selected. ** depending on the number of clusters and the segmentation and integration times. *** excluding the remote optical head

OPERATING PRINCIPLE: ADDRESSED MEASUREMENT

1 RGB observation · 2 zone segmentation · 3 addressed spectral measurement · 4 on-board analysis inside the sensor, 4 to 10 Hz

STATE OF THE ART

PRO-PIX has no published sorting case study yet. Near-infrared spectroscopy has, however, established:

- The main packaging resins (PE, PET, PP, PS, PVC) can be told apart by diffuse reflectance between 900 and 1700 nm, including on a conveyor.
  Identification and classification of plastic resins by NIR reflectance spectroscopy
- PET is commonly identified by its characteristic band near 1660 nm and PVC by a maximum shifted to 1716 nm: the absorbance ratio between the two is enough to separate them.
  PET / PVC separation methods by NIR, as used in automated sorting systems
- In this range, the spectra of light-coloured resins are independent of tint: sorting is by polymer, not by colour.
  Application note, sorting of coloured resins by NIR spectroscopy
- Residual moisture in household packaging has been quantified non-destructively by NIR hyperspectral imaging on a conveyor.
  Moisture quantification in plastic packaging waste by NIR-HSI, 2025

WHO FOR?

- **Sorting plant operators**: find out what is actually moving through a stream.
- **Recyclers and material recovery operators**: qualify an incoming batch before committing it.
- **Equipment makers and engineering consultancies**: put a figure on discriminability before investing.

CONDITIONS AND LIMITS OF USE

- **Materials loaded with carbon black cannot be identified in this range:** carbon black absorbs near-infrared radiation. This is a limit of NIR spectroscopy itself, not of the sensor.
- 4 to 10 Hz at best: the fit is spot checking, batch qualification and area monitoring, not single-item ejection on a fast stream.
- Working distance from 1.5 m; IP65 across the complete system; 0-40 °C.
- **No discrimination is promised before measurement.** The segmentation model and the spectral library remain to be established on your materials: that is precisely what the feasibility study is for.

LET'S TEST YOUR MATERIALS BEFORE YOU INVEST.

A feasibility study tells you whether the sorting task is spectrally possible, and in which configuration. Sensor delivered within three months. Rental is available for an evaluation in real conditions.

WHAT TO SEND US

→ Representative samples of your streams
→ The material families to separate
→ The measurement context you envisage

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