



VI.VI

 **CNR-IVALSA**
CENTRO NAZIONALE DI RICERCA SULLA QUALITÀ DEL LEGNAME

 **SIS NIR**
SISTEMI DI MISURA INFRAROSSI

MicronIR & Wood

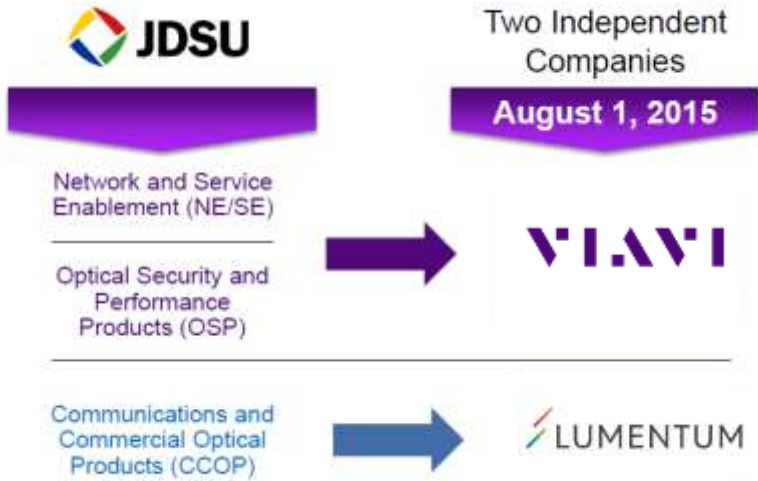
Emiliano Genorini
San Michele all'Adige - April, 19th



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Company profile

Company Profile - Viavi Solutions



VIAVI

Our Vision

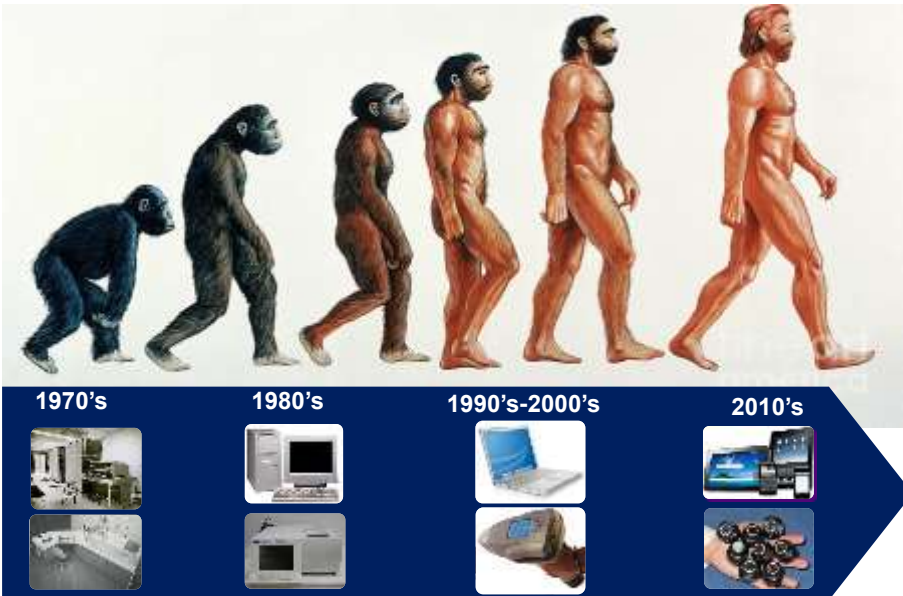
MicroNIR - Our Vision



MicroNIR - Our Vision



MicroNIR - Vision



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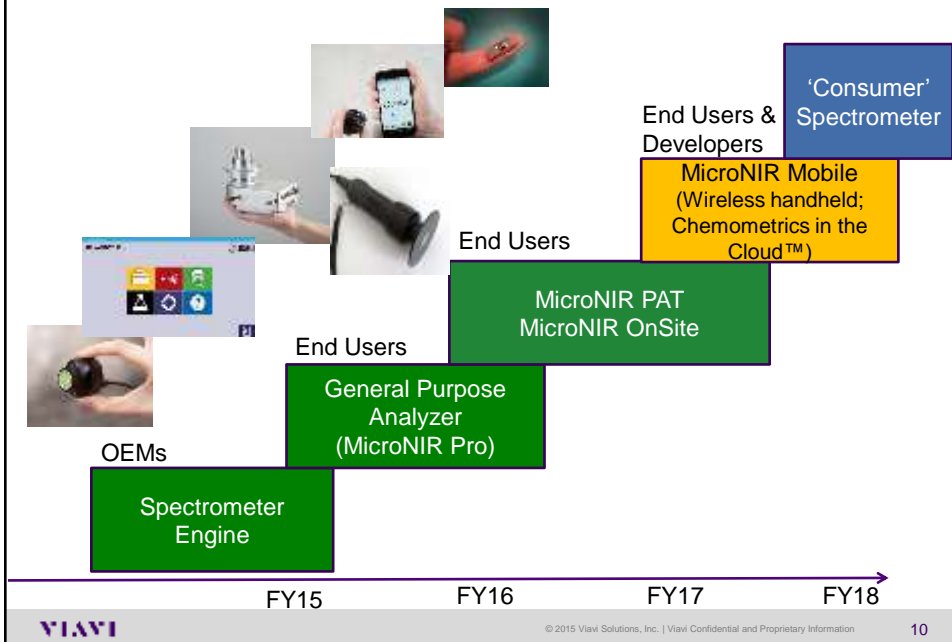
MicroNIR - Our Vision





Go to horizont

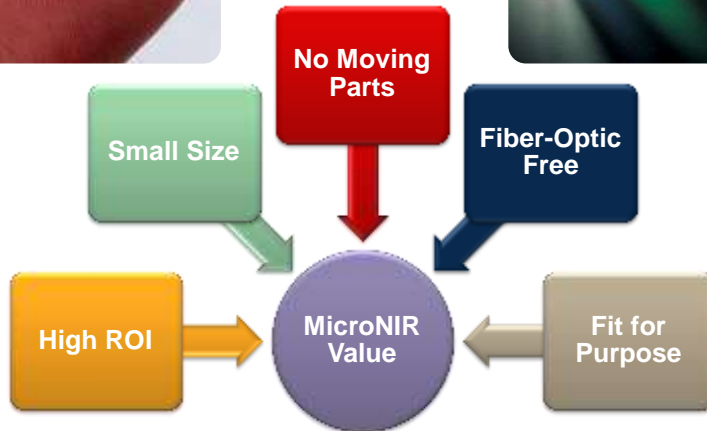
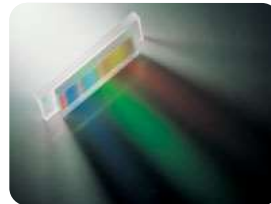
MicroNIR - Roadmap





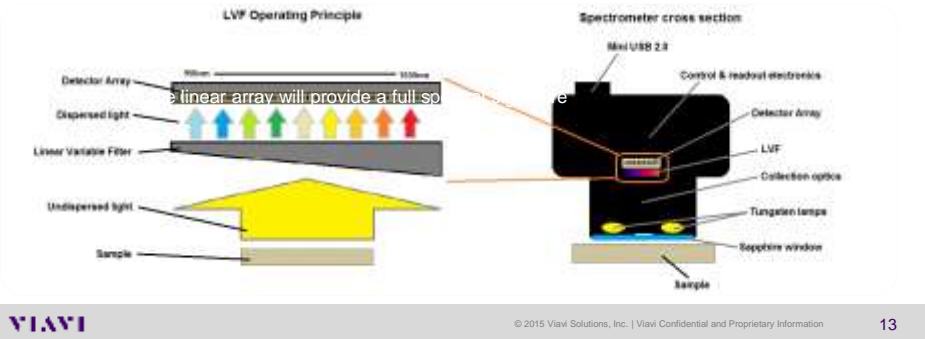
Linear Variable Filter Technology

MicroNIR - LVF



MicroNIR - LVF

- LVF is mounted directly over a photodiode detector array
- Polychromatic light illuminates the linear variable filter (LVF).
- The wavelength transmitted through the filter is dependent on its linear position along the filter.
- Each pixel detects a specific wavelength of light

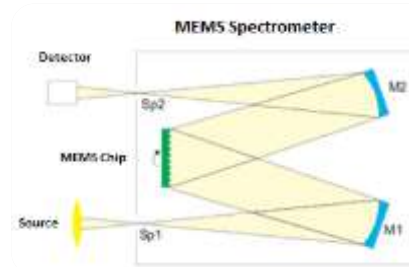
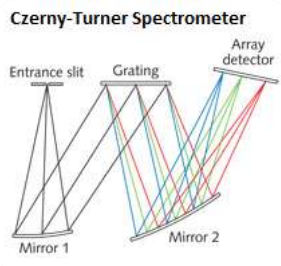


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MicroNIR - LVF



Advantages of LVF based NIR:

- Size & Cost
- No Moving components
- Fiber optic free → Higher stability for no temperature variation
- No Laser → no need to be replaced

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Multiple accessories

- Weight: 64g (2.3 oz)

MicroNIR™
Enabling a Smarter World

950-1650 nm
 High reliability
 Model building software
 Real-time analysis
 Field, At-line, or In-line analysis
 Pharma, Food, Agriculture

- USB-Powered
- IP65 Enclosure
- Stainless steel a
- Weight: 318g (1

or External power
 <3 lbs)

MicroNIR - Sampling Techniques

Powders & solid materials → Liquids & slurries → Thin films & opaque liquids

Reflectance Mode: The sample is placed on a reflective surface. The diagram shows a probe tip with a yellow sample on a grey reflective base.

Transmission Mode: The sample is placed in a flow cell or cuvette. The diagram shows a probe tip with a yellow sample in a blue flow cell, with a yellow cuvette below it.

Transflection Mode: The sample is placed on a reflective standard. The diagram shows a probe tip with a yellow sample on a white reflective standard.

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Company Profile - Main Applications

OEM

- Appliances
- Forages
- Eggs
- Milk
- Narcotic ID

AFF

- Food Authenticity
- Food freshness
- Cheese
- Meat
- Eggs
- Feed
- Olive and oil
- Wood

Pharma

- PAT and continuous manufacturing
- RMID
- Fluid Bed Drying
- Granulation
- Blending
- Coating
- Tableting

Company Profile - Sky is the limit?



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Feed Applications

MicroNIR - Feed

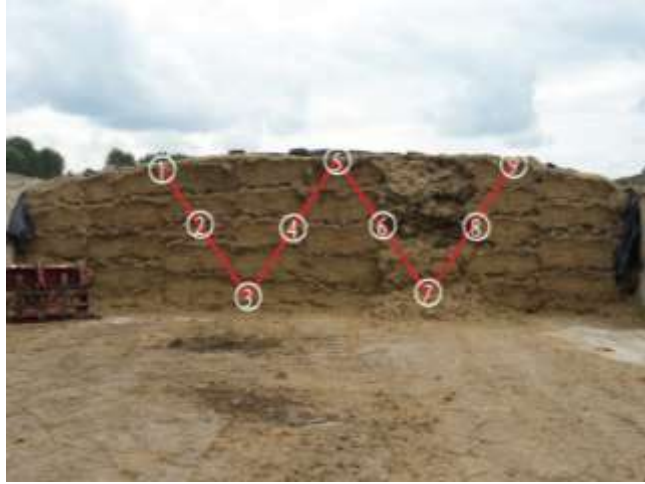
- Integration Time → 12.5 ms
- Scan Count → 100
- Mode → Diffuse Reflectance + applicator
- Accessory → sample cup spinner
- Sample Cup → none
- Samples → unground

**VIAMI**

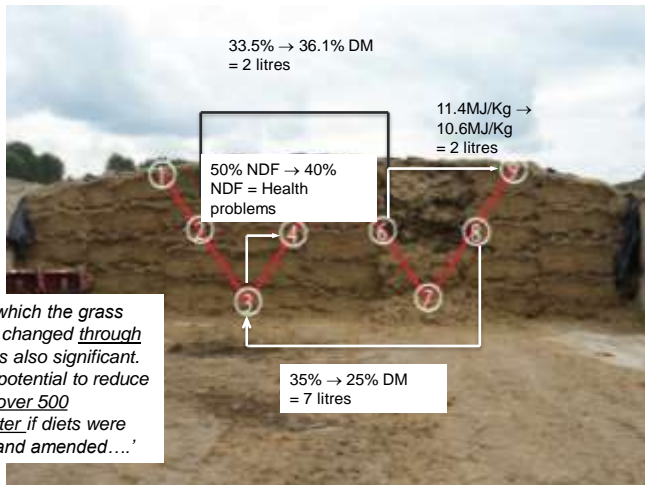
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MicroNIR - Feed



MicroNIR - Feed



'The level to which the grass silage quality changed through the winter was also significant. This had the potential to reduce milk yield by over 500 litres/cow/winter if diets were not checked and amended....'



Milk applications

MicroNIR - Milk

- Handheld NIR system for milk analyses in just seconds in the farm.
- With TaNIR milk analyzer, milk companies can analyze amount of
 - Protein
 - Fat
 - Lactose and
 - Dry matter
- No need for time consuming and expensive analyses in the laboratories with the other milk analyzer.

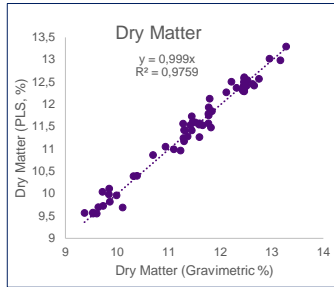
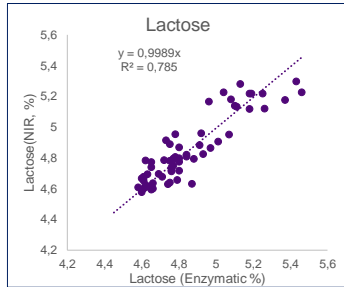
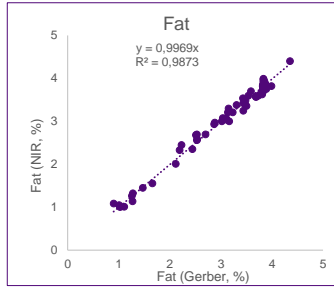
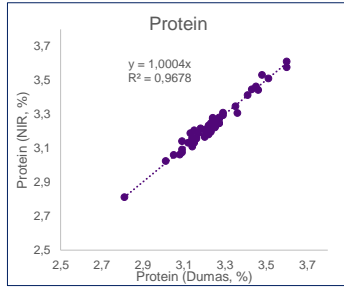




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MicroNIR - Milk



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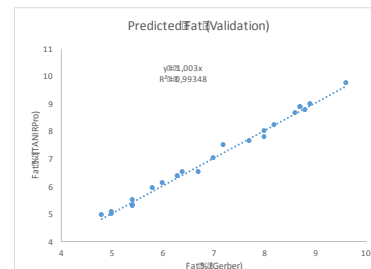
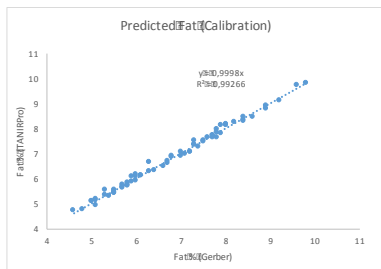
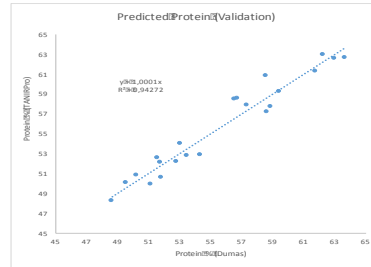
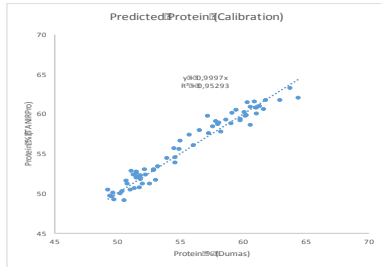
Egg applications

MicroNIR - Eggs

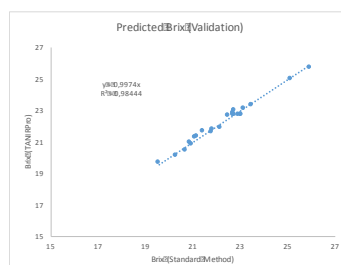
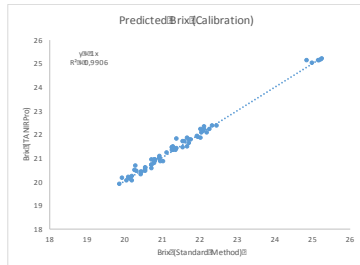
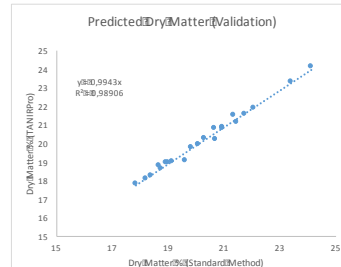
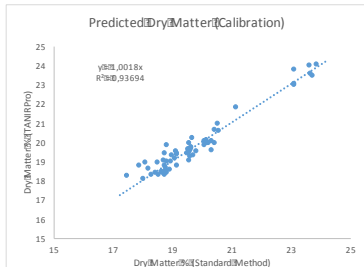


- TaNIR Pro is a small and affordable eggs analyzer with high performance
- Measurement is in transfection
- Samples are preheated at 40 °C
- Transflector is heated at 40°C to keep temperature at a given level during measurements
- Leds indicates when temperature is in the settled range

MicroNIR - Eggs



MicroNIR - Eggs



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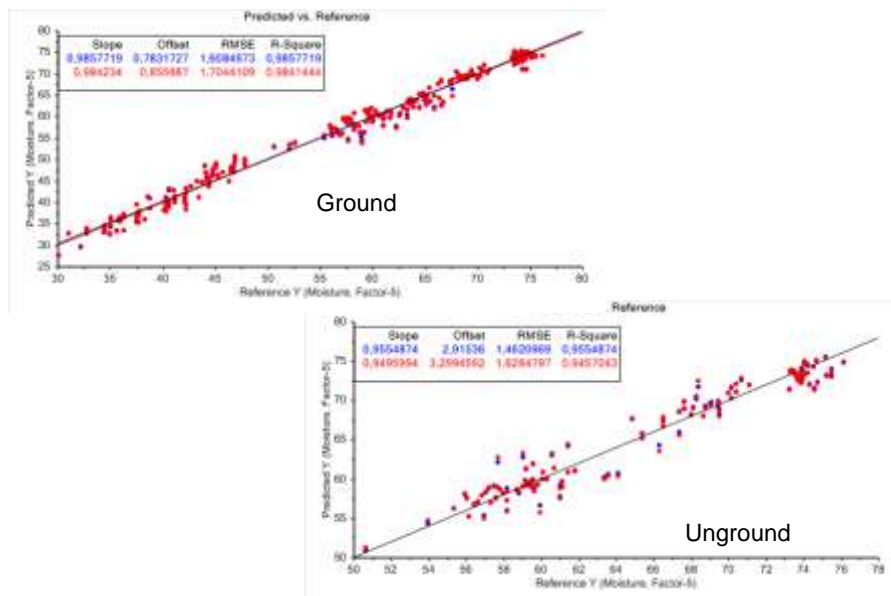
Meat Applications

MicroNIR - Olive and Pomace

- Integration Time → 12.5 ms
- Scan Count → 1200
- Mode → Diffuse Reflectance
- Accessory → sample cup spinner
- Sample Cup → Glass PD
- Samples → ground + unground



MicroNIR - Meat



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Live Fish (Salmon)

MicroNIR - Live Fish (Salmon)

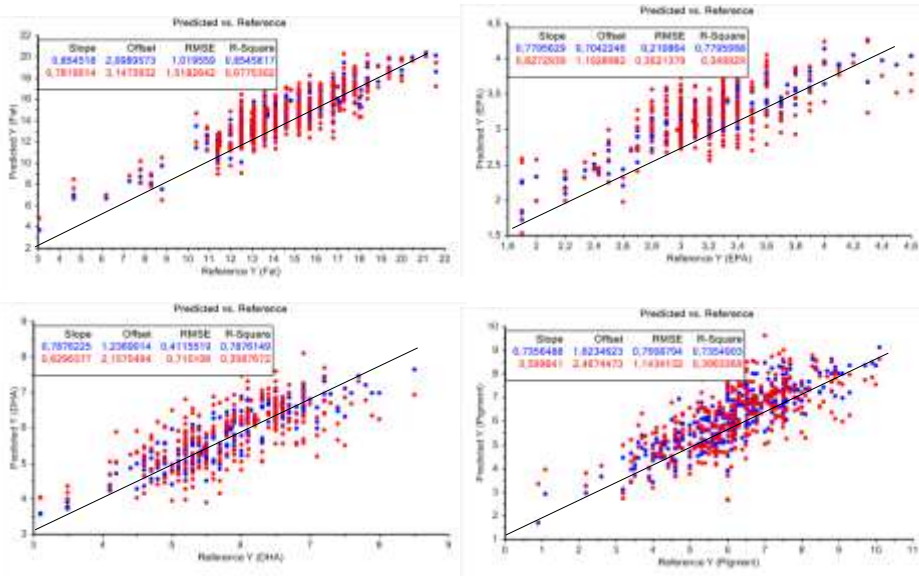
- Integration Time → 12.5 ms
- Scan Count → 100
- Mode → Diffuse Reflectance
- Accessory → none
- Sample Cup → non
- Samples → as is

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MicroNIR - Live Fish (Salmon)



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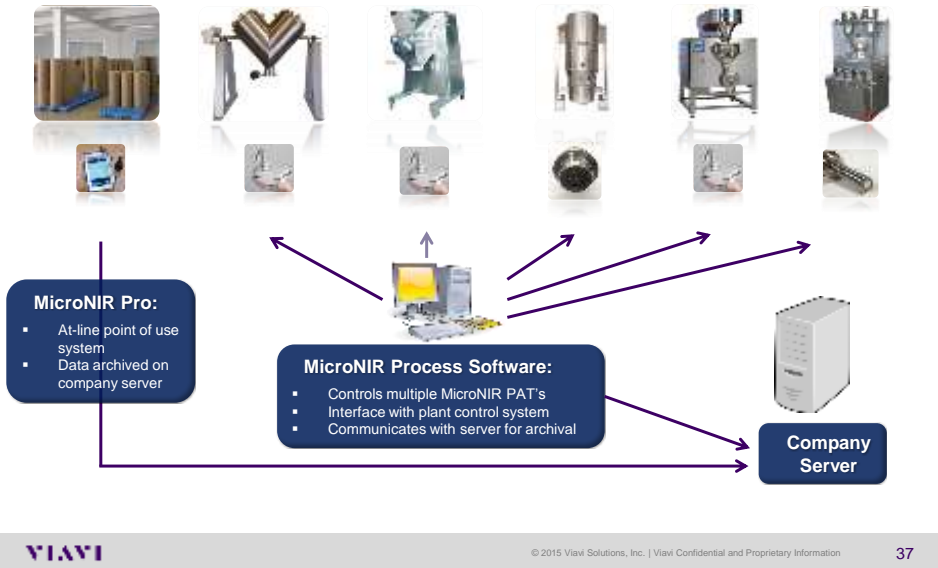
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Granulation\FBD

MicroNIR - MircoNIR PAT

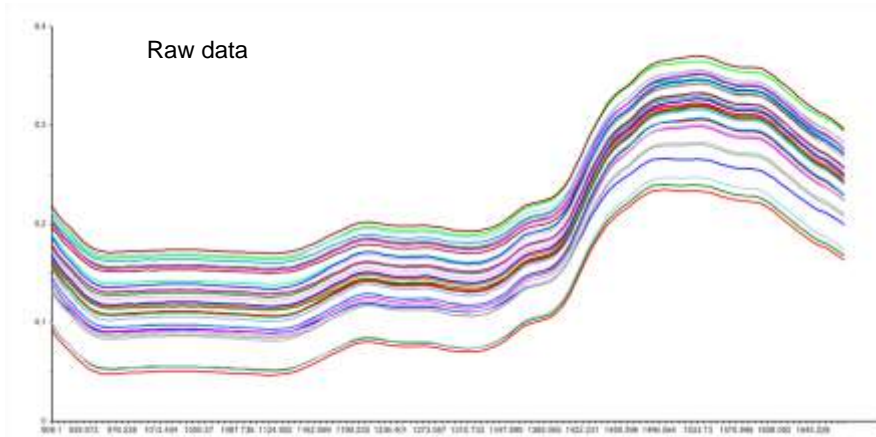


MicroNIR - Fluid Bed Dryer



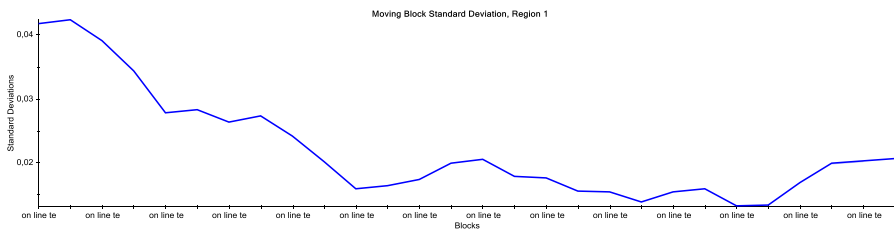
- Very small lab scale → 15 L
- Process is in 2 phases:
 - P1 → Mixing between lactose and cellulose microcrystalline
 - P2 → Granulation with 10 %PVP/water
- Not only quant approach → calibration free

MicroNIR - Fluid Bed Dryer\1P1

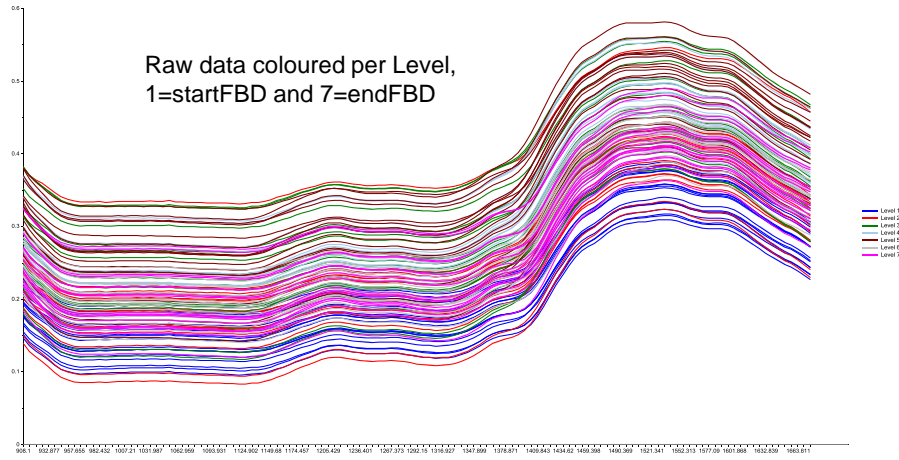


MicroNIR - Fluid Bed Dryer\1P1

- MBSD → Moving Block Standard Deviation
- Block size → 5
- Spectral range → 900 - 1700 nm

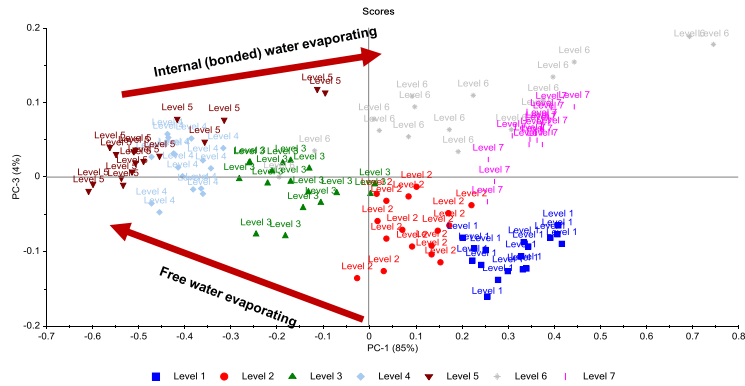


MicroNIR - Fluid Bed Dryer\P2



MicroNIR - Fluid Bed Dryer\P2

PCA on SNV data (reduced spectral range)



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Blending



MicroNIR - Blending



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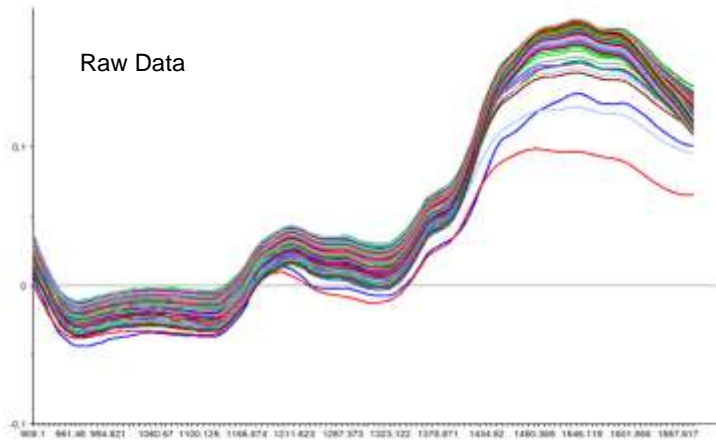
MicroNIR - Blending



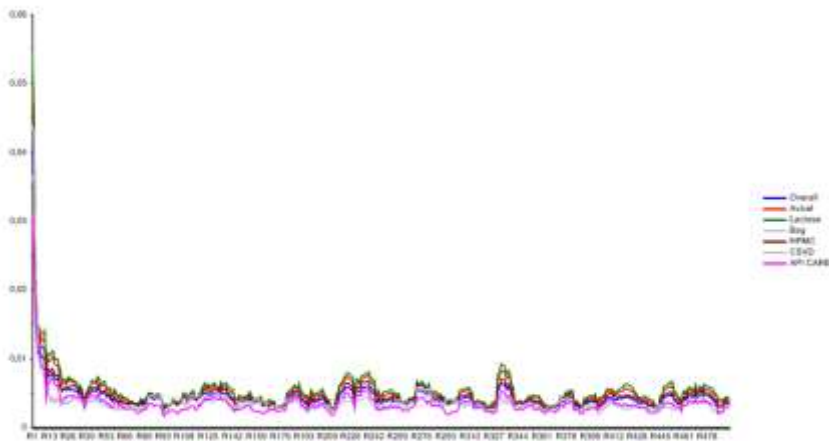
MicroNIR - Blending



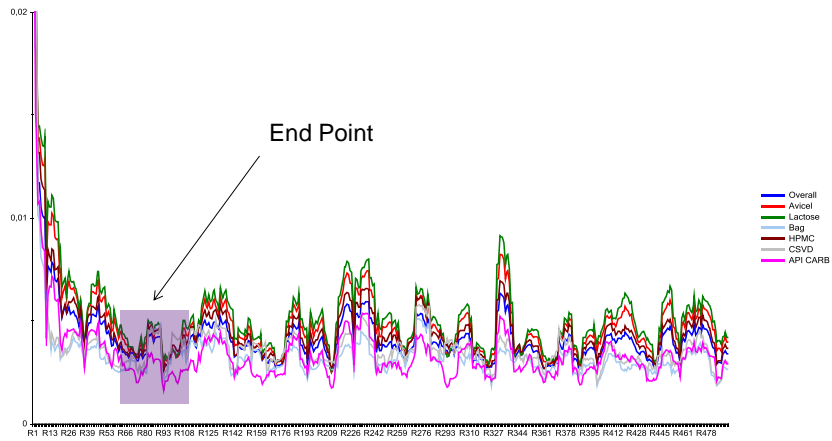
MicroNIR - Blending



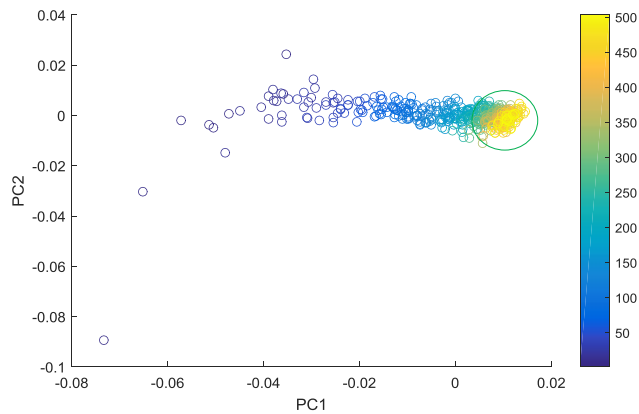
MicroNIR - Blending



MicroNIR - Blending

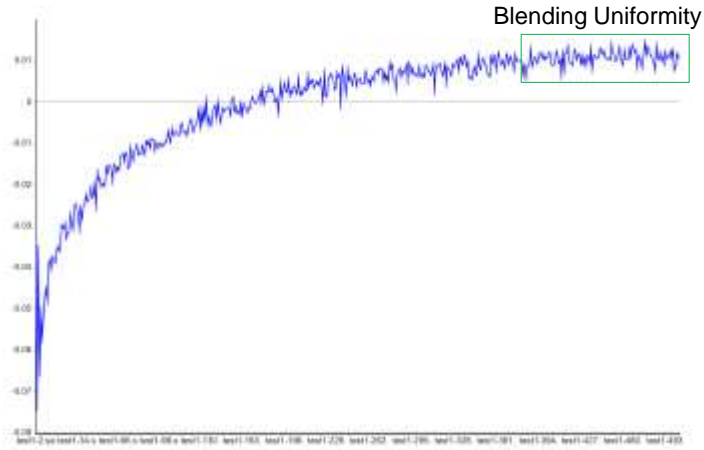


MicroNIR - Blending



- Change of the 1st PC score from negative to positive indicates blending uniformity is reached after ~ 350 rotation

MicroNIR - Blending



- Change of the 1st PC indicates blending uniformity is reached after ~ 350 rotation

