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SPECTROSCOPY SYSTEMS INTEGRATED IN FOOD MANUFACTURING AND PROCESSING EQUIPMENT

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European Photonics Roadshow New Technologies in agriculture & food industry

16 May 2019 - 17 May 2019 | Barcelona, Spain

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Outline

- Introduction
- NIRS: Basic ideas
- System technologies and components
- Food application, equipment and systems
- Current projects under study

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Introduction

- Origin: Spin-off from the research group Applied Photonics Group (University of the Basque Country)
- Company mission: To apply photonic solutions to all kind of industries
- Initial projects:
  - Bladed-rotor monitoring system → Turbines, compressors, fans,…
  - Integration of spectroscopy based sensors in food/pharma processes

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NIRS: Basic ideas

- Response of molecular bonds within the sample to NIR radiation (λ=800-2500 nm)

- NIR spectrum:

  - Light is either absorbed or scattered

  - Photon energy absorptions representing overtones and combinations mainly associated with –CH, –OH, –NH, and –SH functional groups

  - Information about the chemical composition and physical properties of the sample → Chemometrics

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System technology and components

- Light source: tungsten lamp
- Optical probes/cells
  - Transmission
  - Reflection
  - Transflection
- Spectrometer
- PC

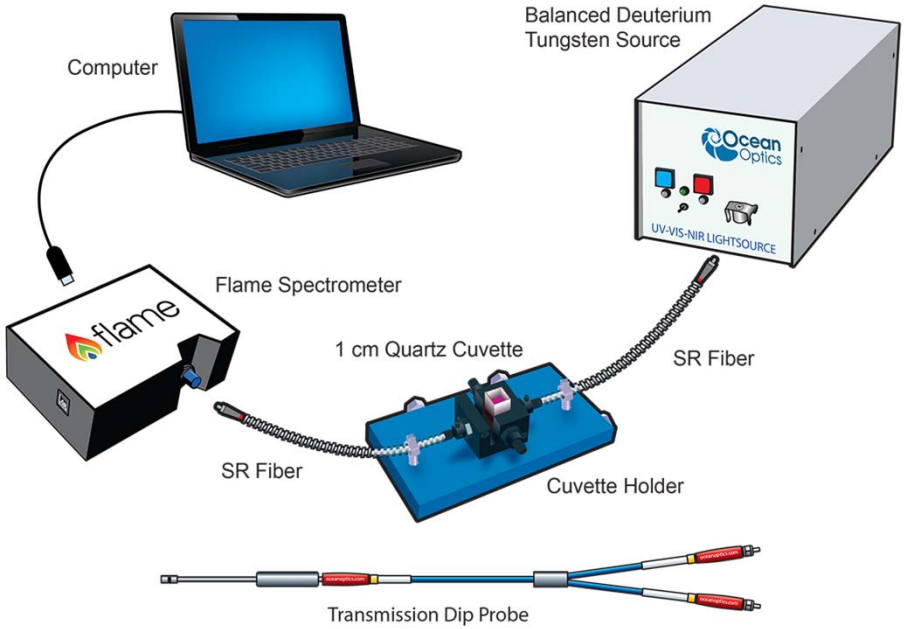

Image from Ocean Optics, Inc.

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Food applications

- Dairy → % fat, protein, lactose, dry matter
- Milk powder production → % fat, protein, moisture
- Oil → free fatty acids, phospholipids, moisture
- Grain and flour → % protein, ashes, moisture, fiber
- Meat and fish → % fat, protein, moisture
- Wine → % alcohol, sugars, acids
- Counterfeit and adulterated products

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Food equipment and systems

- Pasteurizers
- Fermenting tanks
- Reactors
- CIP systems
- Mixing systems
- Homogenizers
- Drying process
- Milk concentration
- Evaluation of raw materials and finished product
- Complete process quality assurance systems by monitoring key parameters in real time.

Image from Inoxpa S.A.U.

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Current projects under study: Ultrafiltration monitoring

- Customer: Cheese factory
- Problem: Different amount of final product (cheese) using the same amount of raw material (milk)
- Cause: Different milk concentration factor in the ultrafiltration stage
- Proposed solution: Monitoring of milk concentration at the output of the equipment to keep stable

Image from Technical Tecnología Aplicada S.L.

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Current projects under study: Milk standardization

- Customer: Dairy company
- Problem: Milk characterization during standardization and optimization of the process
- Proposed solution: Standardization skid based on the measurement of % fat for the skimmed milk and cream at the inlet and % fat, protein and lactose at the outlet using NIRS

Image from Inoxpa S.A.U.

Thank you for your attention

Any questions?

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