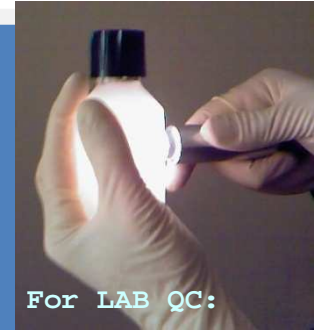


For PROCESS  
control:  
SAM-Spec<sup>®</sup>  
liquid cell

## SAM-Spec<sup>®</sup>



For LAB QC:  
SAM-Spec<sup>®</sup> sensor



### SAM-SPEC<sup>®</sup> BREAKTHROUGH:

#### MONITORING BOTH PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF TURBID SOLUTIONS USING A REAL TIME AND NON-DESTRUCTIVE METHOD

➔ Separation of absorption and scattering signals in spectroscopy to accurately characterize turbid liquids

#### BACKGROUND

Vibrational spectroscopy can be employed to accurately measure clear liquids in transmittance. The characterization of turbid liquids, using retro-diffusion signals, is much more difficult.

#### OUR CUTTING-EDGE TECHNOLOGICAL SOLUTION

**ACCURACY AND SIMPLICITY:** The SAM-Spec<sup>®</sup> technology measures the spectroscopic signals at several locations. The system is able to differentiate between **physical parameters** (turbidity, cell status) and **chemical composition** (concentration changes, polymers).

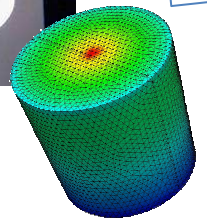
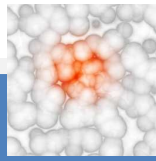
**PERFORMANCE:** Thanks to the optimal positioning of the optical fibers in the liquid cell, SAM-Spec<sup>®</sup> enables the real time analysis of the chemical composition and physical properties of liquids, such as suspensions, waste, multiphase emulsions, cell cultures, polymerization, etc.

#### INNOVATION & PRAGMATISM

The sensor outputs are provided in real-time, either to the operator or directly to the process controller (PLC/RTU), to monitor or control processes such as bioreactors. The measurement solution provided is flexible:

- The SAM-Spec<sup>®</sup> measurement head can be **connected to most commercially available visible-near infrared spectrometers** thereby opening new fields of application to existing equipment.
- A stand-alone **dedicated solution** can also be designed for specific applications, such as instrumentation for process equipment control.





## SIGNAL PROCESSING: SIMULATION AND CHEMOMETRICS

A dedicated software package has been developed to fit to SAM-Spec® 2D outputs: **Finite Element Simulation** (F.E.M.) can forecast the spectroscopic phenomena taking place in turbid solutions and untangle the absorption and scattering signals. Chemical and physical characteristics are then calibrated and predicted.

## IMPLEMENTATION

- On-line Process Monitoring, for industrial end-users as well as for process equipment manufacturer.
- Laboratory / At-line Quality Control for en-users.

## APPLICATION EXAMPLES

- Concentration of organic compounds in turbid solutions (e.g., syrup, waste, ...)
- Turbidity measurement (suspended solids) in turbid fluids
- Monitoring of cell growth in bioreactors: cell count, types and status
- Characterization of multiphase emulsions (e.g., milk, intra-lipids)
- Polymerization monitoring
- Crystallisation monitoring

**> PROCESS EQUIPMENT MANUFACTURERS: implement SAM-Spec® sensor in your equipment for better process control!**

**Example:** INDATECH is collaborating with a process equipment manufacturer (IMECA Process) and a research centre (Montpellier University) to design a novel environmentally-friendly Cleaning-In-Place (CIP) station, called ECONEP.

SAM-Spec® liquid cell is directly hooked up to the cleaning process pipes, for a precise and real-time feedback to the CIP controller, based on the chemical and physical composition of the cleaning solutions.

