Pacific Northwest NATIONAL LABORATORY

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Available Technologies

# Raman Based Process Monitor For Continuous Real-Time Analysis

## SUMMARY

Researchers at Pacific Northwest National Laboratory have developed a new monitoring system to quickly generate real-time data/analysis to facilitate a timely response to the dynamic characteristics of a chemically complex process stream. The process monitor features Raman and Coriolis/conductivity instrumentation configured for the remote monitoring, MatLab-based chemometric data processing, and comprehensive software for data acquisition/storage/archiving/display. Though the system has been successfully demonstrated for use in a radioactive high level waste stream, it is quite adaptable to other applications.

The current monitoring system is capable of simultaneously and continuously quantifying the levels of all the chemically significant anions within the waste stream including nitrate, nitrite, phosphate, carbonate, chromate, hydroxide, sulfate, and aluminate. The total sodium ion concentration was also determined independently by modeling inputs from on-line conductivity and density meters. In addition to the chemical information, this monitoring system provides immediate real-time data on the flow parameters, such as flow rate and temperature, and cumulative mass/volume of the waste stream. The components and analytical tools of the new process monitor can be tailored for a variety of complex mixtures in chemically harsh environments, such as pulp and paper processing liquids, electroplating solutions, and the various streams in the nuclear fuel cycle.

The monitoring system has passed rigorous acceptance tests for deployment at Hanford for use in radioactive tank waste retrieval activities.

## ADVANTAGES

* Provides continuous, real-time, online monitoring of process stream composition and other parameters;

* In addition to immediate process feedback, the system enables identification of data trends;

* Improves personnel and operational safety;

* Reduces process interruptions and human error;

* Versatile and adaptable to various process streams and applications.

## Technology Portfolio(s)

- Nuclear & Radiological
- Combination Sensors

## Potential Industry Applications

- Agriculture & Mining
- Chemicals
- Energy & Utilities
- Oil & Gas
- Recycling & Waste Management

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