

SPORIAN®
MICROSYSTEMS, INC

SPECIQ®

**IN SITU, REAL-TIME,
HIGH-TEMPERATURE
CHEMICAL COMPOSITION
MONITORING SOLUTIONS**

**Sporian Microsystems specializes in sensing and monitoring solutions
for very high-temperature and harsh environments, including
technology solutions for high-temperature chemical composition
monitoring in industrial environments.**

Innovative Technology

For high-temperature chemical composition classification and monitoring, Sporian's innovative technology is based on a high-temperature implementation of Raman spectroscopy.

Raman spectroscopy quickly provides highly specific information that can be used to identify multiple compounds simultaneously. Raman-active chemical species exhibit distinct spectra that provide "fingerprint" information on the vibrational transitions within a molecule.

When combined with advanced machine learning algorithms, Raman spectroscopy is ideal for implementing a robust, automated molecular identification system.

Sporian's systems are currently designed to operate at temperatures up to 900°C (1650°F) within very corrosive, oxidizing, and reducing environments, but higher-temperature configurations may be available on request.

These systems are principally designed for autonomous function with minimal human/user interaction, but direct human control implementation can be supported. Please inquire about availability and suitability for specific customer applications.

Key Features



High-temperature operation



Corrosive environments



Classification and quantification



Multi-species classification



Autonomous operation



Real-time, in situ analysis
and feedback

Example Industries & Applications

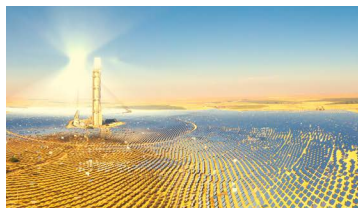
Nuclear Energy

Thermal storage/transfer fluids
sCO₂/Closed cycle working fluids
Molten salt stability and corrosion



Metal Making and Processing

Process QA/QC
Molten salt heat treating contaminants
Molten salt dip braze processes
Emissions



Concentrating Solar Power

Thermal storage/transfer fluids
sCO₂/Closed cycle working fluids
Molten salt stability and corrosion



Glass Manufacturing and Processing

Glass production process
Ion exchange baths



Fossil Energy

Fuel gas composition
Closed cycle working fluids
Fugitive emissions characterization
Carbon capture



Chemical Processing and Manufacturing

Process control
Polymer synthesis/conversion
Extraction/infiltration
Waste processing



Oil & Gas

Hydrogen/gas blends
Fuel gas composition
Monitoring of cracking/refining
Petrochemical processes



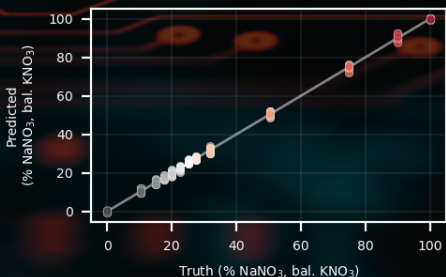
R&D

Process characterization
High-temperature materials research
Catalytic mechanisms/poisoning
Nano materials

Example Application Data

Real-Time Molten Salt Mixture Monitoring

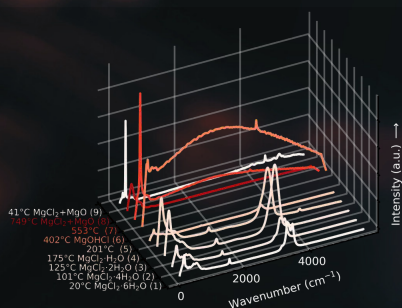
Molten salts are important fluids for a range of high-temperature (350-900°C) applications, including metal processing, heat storage/transfer fluids for concentrating solar power, nuclear energy, and ion-exchange glass strengthening. Maintaining composition control is vital, however monitoring composition real time is impractical with current sensing technologies. Sporian's high-temperature-operable monitoring instruments are currently being used for the identification and quantification of molten nitrate mixtures in real time.



Regression analysis of data used to predict NaNO₃/KNO₃ mixtures concentrations at 400°C.

Following High Temperature Chemical Reactions Real Time

For many high-temperature applications, understanding how materials change state and chemical composition with temperature can be key to technology and process viability. Because Raman spectroscopy provides highly specific identification and can ID/quantify multiple compounds simultaneously, it can be used to follow material and chemical reactions real time as temperatures change. For example, monitoring hydrated molten MgCl₂ water content and chemical composition from room temperature through melting (750°C) is useful for understanding the corrosion and reaction potential of the salts under use.

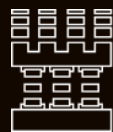


Time series MgCl₂ hydrate formation Raman spectra with corresponding temperatures.

CONTACT US

**SPORIAN MICROSYSTEMS IS READY TO
HELP YOU WITH OFF-THE-SHELF OR
CUSTOM SOLUTIONS TO MEET YOUR
SENSING NEEDS.**

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