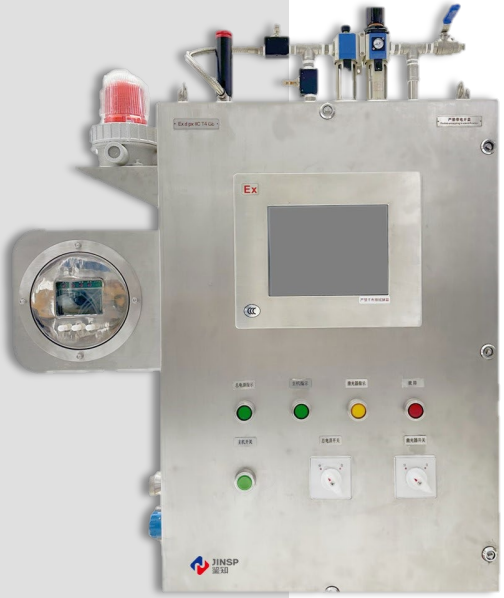
SPECTRAL ANALYSIS
TECHNOLOGY AS THE CORE

JINSP 鉴知

RS2100PAT
在线拉曼分析仪



鉴知®RS2100PAT在线拉曼分析仪可用于化工产品生产过程中**原位、实时、连续在线监测**。

RS2100PAT尤其适用于**硝化、氯化、氟化、加氢、重氮化**等危险反应，可应用于连续流和间歇反应过程监测中，可帮助用户实时了解反应状态、监控产品质量。

技术优势

- **原位：**无需取样，避免接触危险样品
- **实时：**数秒内给出结果
- **连续：**全过程连续监测
- **智能：**自动给出分析结果
- **互联：**及时将结果反馈中控系统

可监测的组分

原料含量
产物含量
中间产物含量
副产物含量

可获取的信息

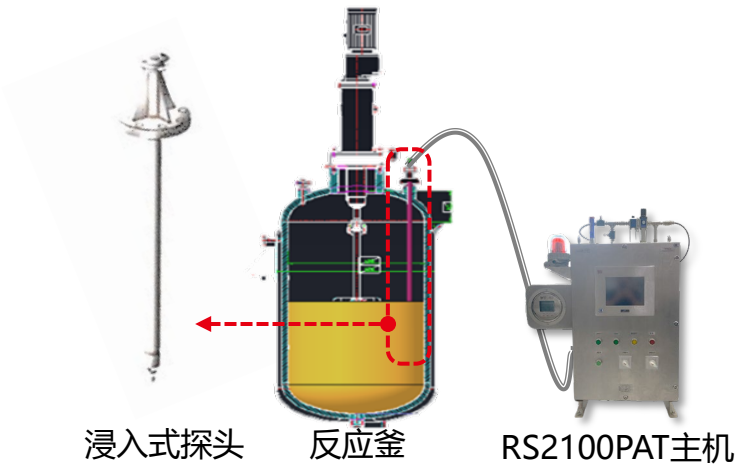
反应终点
反应异常
反应速率
原料转化率
产品一致性
产品是否合格

北京鉴知技术有限公司
JINSP COMPANY LIMITED

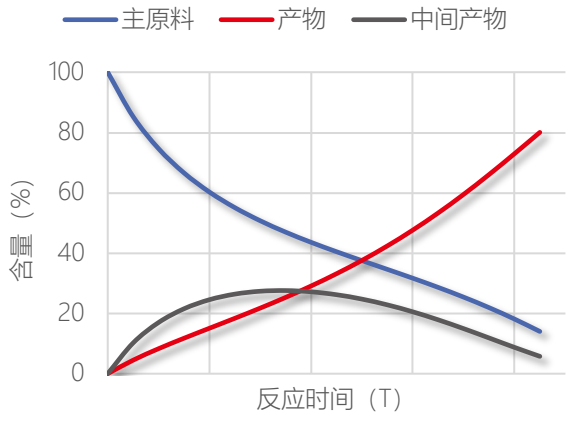
北京鉴知技术有限公司，简称“鉴知技术”，是一家以光谱检测技术为核心的专业公司。鉴知技术源自清华大学，现隶属中核集团，历经16年的技术积累，公司的核心关键技术达到国际领先水平，专利累计申请数超过200件。

RS2100PAT在线拉曼分析仪

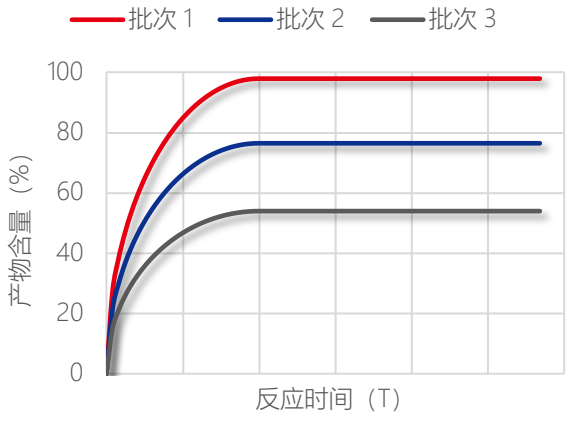
应用方式



反应过程连续监测



精确控制产品质量



技术参数

流通池	多种接口规格，可方便接入各种连续流反应器中；也可配合反应釜自动取样器，进行釜式反应监测
浸入式探头	探头长度1~3 m，光纤长度1~200 m，提供法兰的安装方式，可方便接入各种反应器中
防爆设计	设备采用防爆设计，适用于2区工厂环境
适配工控系统	RJ45网口，提供Modbus协议，可适配多类型工业控制系统，可反馈结果给控制系统
耐高低温	探头适用于-60 ℃ ~ +200 ℃，适用于低温及高温严苛工况
耐高压	探头耐15 MPa高压，可对高压反应进行监控
防腐蚀	探头在硫酸、盐酸、硝酸、氟化氢等强腐蚀性体系中均适用
稳定性好	具有三级温控系统设计，在-20-50 ℃环境中均能长时间稳定运行，适用于不同工厂在线监测环境
多组分监测	同时获取反应过程中多种组分的含量
一致性高	设备校准和模型转移专利算法，确保多台设备数据的一致性
24h工作	内置实时的自动校准和自检，恒温控制以及正压防护
可定制	可根据客户需求配置产品参数，最大化满足客户需求

北京鉴知技术有限公司

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SPECTRAL ANALYSIS
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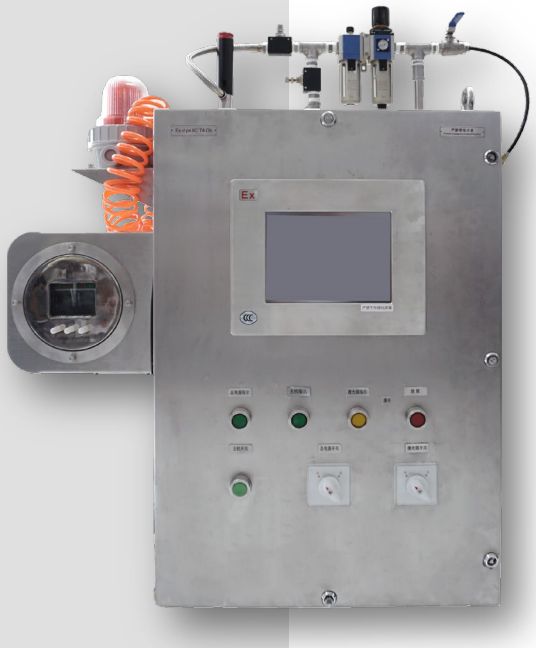
RS2100PAT
Online Raman Analyzer

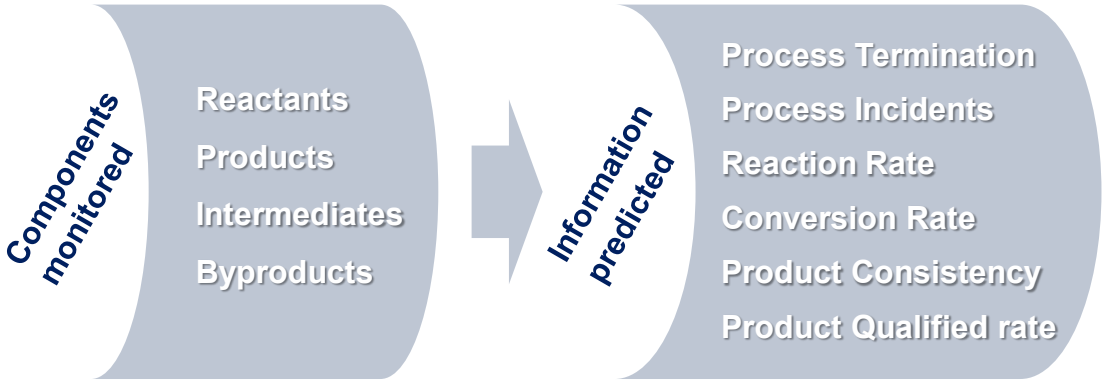


JINSP® RS2100PAT online Raman analyzers provide ***in situ*, real-time** and **continuous** composition analysis of chemical processes in the production environment.

RS2100PAT analyzers are highly suitable for dangerous processes including **nitration, chlorination, fluorination, hydrogenation, diazotization**, etc. Available with both continuous flow processes and batch processes, PS2100PAT analyzers help increase process understanding, and boost product quality.

Benefit Highlights

- **In situ:** Artificial sampling avoided, thus minimizing personnel and environmental risk exposure
- **Real-time:** Single measurement completed in seconds
- **Continuous:** 24/7 process monitoring
- **Intelligent:** Analytical results provided automatically
- **Connected:** Timely feedback to the central control system



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JINSP Company Limited (JINSP) is a company specialized in spectral analytical technology. With the experts in such fields as optics, machinery, electricity and software, we are engaged in the development and production of scientific and industrial spectrometers. With our existing technology, JINSP has won key awards in several international invention exhibitions and more than 200 patents, and passed the European Union CE certification and the EU Civil Aviation ECAC certification. Our thousands of products have been exported to dozens of countries worldwide.

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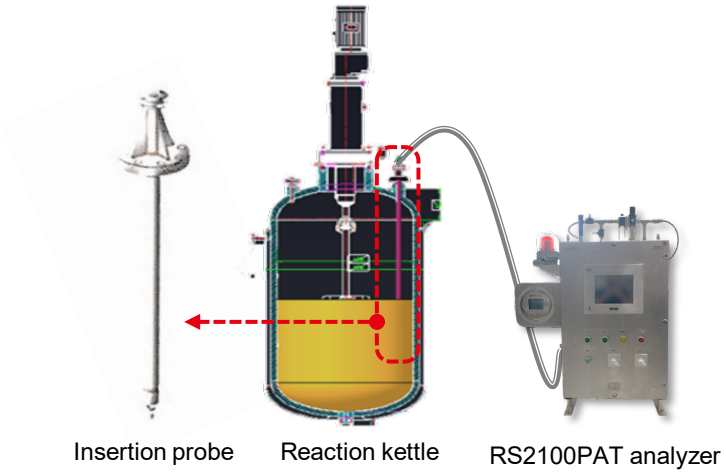
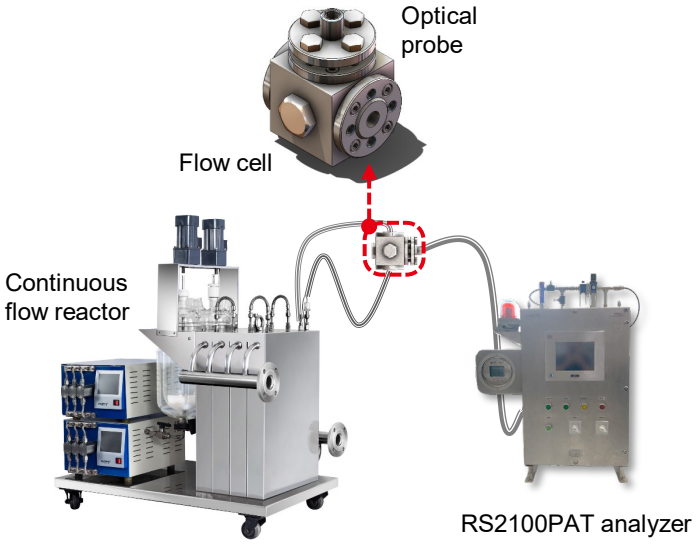
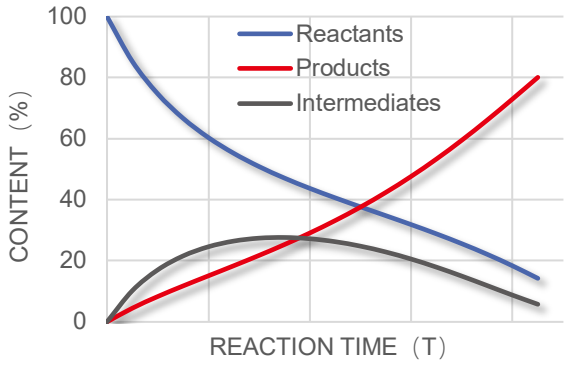
RS2100PAT Online Raman Analyzer

Application Scenarios

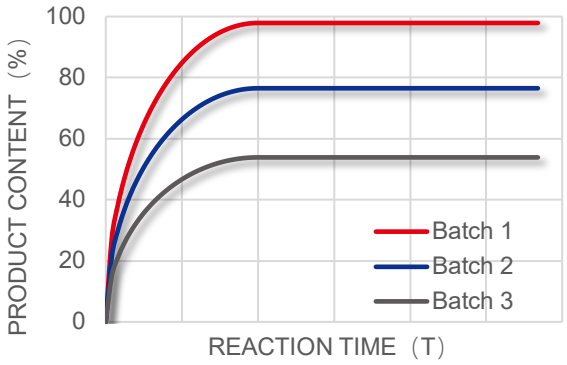




Continuous monitoring of processes



Precise control of product quality



Technical Parameters

Flow cell	Multiple interface specifications provided for easy access to various continuous flow reactors; Compatibility with an automatic sampler to monitor components in kettle reactors
Insertion probe	Probe length 1~3 m; Fiber length 1-200 m; Easy connection to various reactors with a flange
Explosion proof design	Ex d pc IIC T4 Gb
Connection interface	RJ45, Modbus; connection adaptable to various industrial control systems and able to provide feedback to the control system
Temperature	-60 ℃ ~ +200 ℃， special design suitable for harsh working conditions
Pressure	Probe resistant to15 Mpa operating pressure， able to monitor high-pressure reactions
Corrosion resistance	Probe suitable for strong corrosive systems such as sulfuric acid, hydrochloric acid, nitric acid, and hydrogen fluoride
Stability	Three-level temperature control system operating stably for a long time in an environment of -20-50 ℃
Multi component monitoring	Capability to monitor multiple components simultaneously
Consistency	Patent algorithms for device calibration and quantification model transfer to ensure consistency of our devices
24/7 working	Real-time automatic calibration and self inspection, constant temperature control, and positive pressure protection
Customization	Product parameters can be configured to match customer needs

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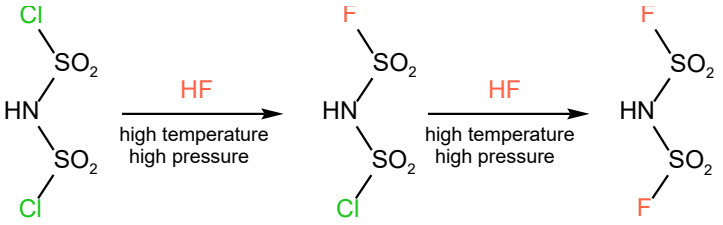
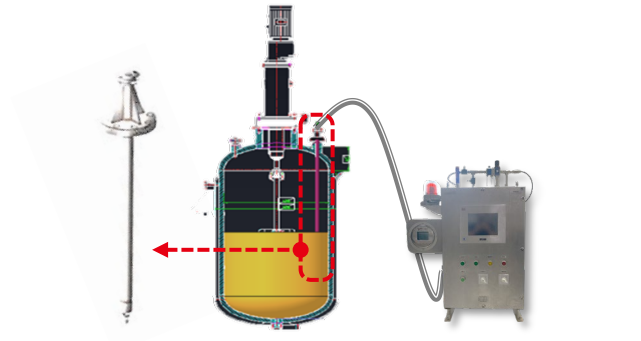
Application Note

Optimization of the Synthesis Process of Imido-bis(sulfuric acid) difluoride

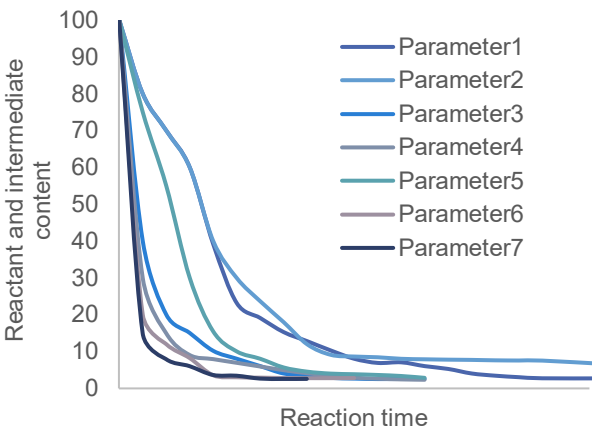
Online spectral analyzer became the optimal research tool in a highly corrosive system

Lithium bis(fluorosulfonyl)imide (LiFSI) is a novel electrolyte additive for lithium-ion battery, with high energy density, thermal stability, and high safety. Recently, the demand for LiFSI was increasing rapidly, making it a hot research topic in the field of new energy resources. The synthesis process of LiFSI involves fluorination reactions. Basically, Imido-bis(sulfuric acid) dichloride, Cl-SO_2-NH-SO_2-Cl, reacts with HF, and Cl in the molecular structure is replaced by F, resulting in the formation of Imido-bis(sulfuric acid) difluoride, F-SO_2-NH-SO_2-F. In this process, intermediate products, F-SO_2-NH-SO_2-Cl, that are not completely replaced may be produced. The reaction conditions are extremely harsh: HF is highly corrosive, highly toxic, and reacts; Besides, the reaction is conducted under high temperatures and high pressures.





Insertion probe Reaction kettle RS2100PAT analyzer



Currently, many research work on this synthesis process focuses on optimizing reaction conditions to maximize the product yield. The only available analytical technology that researchers can use for this harsh reaction is fluorine-19 nuclear magnetic resonance spectroscopy (F-NMR), which is expensive, time-consuming, and dangerous. Specifically, during the several hours long substitution reaction, pressure relief and artificial sampling is required every 10 to 30 minutes, and then the samples are sent to F-NMR laboratory to determine the content of intermediates and products. Due to the complex sampling and analyzing procedure, the research and development cycle for this process is usually several months long. Besides, the sampling process may interfere with the reaction process, making unrepresentative test data.

Online Raman spectroscopy can perfectly solve the limitations of F-NMR mentioned above. Online Raman spectroscopy can be used for real-time and *in situ* monitoring of multiple components including reactants, intermediate products, and products. The insertion probe can be put in the liquid in the reaction kettle directly. The probe is resistant to corrosive reactants such as HF, hydrochloric acid, chlorosulfonic acid. It is also resistant to high temperature up to 200 ℃ and high pressure up to15 MPa . One client of JINSP employed online Raman analyzers to optimize the synthesis process of Imido-bis(sulfuric acid) difluoride. The left figure shows the online monitoring of reactants and intermediates in the synthesis reaction under seven process parameters. Parameter 7 showed the fastest consumption reactants and the earliest termination of the reaction, indicating it was the optimal reaction conditions.