# Raman application guide for the life science industry Trusted composition analysis for

the life sciences







The Raman Rxn-45 probe for process and cGMP applications

### **Bioprocessing applications**

Our leading bioprocess analytical solutions and comprehensive compliance offerings help you get your lab-to-process analysis right the first time

Endress+Hauser Raman systems, powered by Kaiser Raman technology, provide *in situ*, real-time sensing of multiple parameters for cell culture and fermentation bioprocesses. Our offerings for *in situ* bioprocess analytics enable advanced bioprocess control. Our technology scales for use in single-use or reusable bioreactors, in stirred-tank or perfusion, from lab to cGMP. We provide a comprehensive portfolio of services for cGMP applications including: questionnaire and audit support, standard and customized IQ/OQ, Factory Acceptance Testing (FAT), in-house audits, supplier qualification, and cGMP trained service personnel. We ensure quality for our customers by investing in ISO 9001:2015 and hazardous area certifications.

Application family	Parameter	Application note title
Upstream cell culture bioprocessing	Glucose Lactate Titer VCD and more	Analysis of a mammalian cell culture
		Cross-scale <i>in situ</i> Raman monitoring of a cell culture
		Raman-based nutrient control in bioprocessing
		Raman-based advanced process control in upstream bioprocessing for parameters beyond glucose
Upstream fermentation bioprocessing	Sugars Alcohol BioMass	Analysis of a batch fermentation process
Downstream cell culture bioprocessing	Protein higher order structure	Downstream biopharmaceutical operations
		In-line Raman monitoring of protein crystallization

#### Raman bioprocessing applications

Contact Endress+Hauser for additional product and process related parameters.

## **Pharmaceutical applications**

We can help you deliver a transferable and efficient process from primary reactions to continuous solids processing

#### Deliver consistent product quality from the

**beginning** Endress+Hauser's Raman analyzer systems provide *in situ*, real-time analysis of multiple components with a single probe. Through this information, you can gain process understanding, ensure the process is within control, and identify product quality surrogates supporting realtime release. Our Raman technology helps you to efficiently and consistently deliver higher yield and improved product quality with reduced contamination risk.



Raman Rxn-20 probe for coating analysis

Application family	Parameter	Application note title
Active pharmaceutical ingredient (API) manufacturing	Solid form identification (polymorphs, hydrates, solvates, transformations)	Monitoring a pharmaceutical crystal transformation <i>in situ</i>
		Rapid monitoring of antisolvent addition crystallization and dehydration
		<i>In situ</i> monitoring of polymorphic transformation of active pharmaceutical ingredients
		Quantifying anhydrate/hydrate using potential PAT <i>in situ</i> techniques
		Following a process-induced transformation during granulation using <i>in situ</i> techniques
		In-line monitoring of a pharmaceutical freeze- drying process
Drug product manufacturing	Blend uniformity Coating endpoint monitoring Continuous processing	Real-time quality prediction of continuously produced pharmaceutical granules
	Product quality	Quantification of a degradant in an intact pharmaceutical tablet
		Off-line and on-line Raman spectroscopy of API- containing extruded films
	Wet granulation	Following a process-induced transformation during granulation using <i>in situ</i> techniques

### Raman pharmaceutical applications

Contact Endress+Hauser for additional product and process related parameters.



### Want to view or download one of these application notes?

Simply enter its title in the "Find Products, Downloads, and more..." search field at **www.endress.com**.

www.addresses.endress.com

