



## E+H Raman Enables Real-Time Bioprocess Monitoring and Control

- Information-rich spectra provide a continuous process fingerprint
- One probe measures multiple analytes from up to 8 bioreactors simultaneously
  - For cell culture: Glucose, Lactate, Glutamate, Glutamine, Ammonium, Osmolality, Titer, VCD, viability, additional amino acids and quality markers possible
- Sampling is non-destructive, so can be used in sequence with other analyzers
- Flow cell spectra compatible with in situ bioreactor Raman probes for method transfer and scale-up
- Applicable to downstream, cell, and gene therapies and other bioprocess operations requiring multi-attribute, real-time measurements

## Flownamics Seg-Flow + Endress+Hauser

- Raman spectroscopy is a light scattering technique
- Raman spectra provide a "molecular fingerprint", enabling qualitative and quantitative analysis
- Benefits of E+H Raman for Bioprocesses:
  - Insensitive to water
  - High chemical specificity to key process parameters
  - Measures multiple attributes with one probe: glucose, lactate, VCD, titer, amino acids, etc.
  - Versatile to many applications and analytes
  - Fiber-optic cabling and multiplexing enable flexible installations
  - Scalable from lab to pilot to production

## Data Communication and Sample Flow from up to 8 Paths

- Sample extraction programmed into Seg-Flow - up to 8 paths
- Seg-Flow directs sample to E+H Raman flow cell and triggers collection
- E+H Raman analysis integrated with Seg-Flow sample ID
- Seg-Flow moves sample from flow cell and triggers cleaning

