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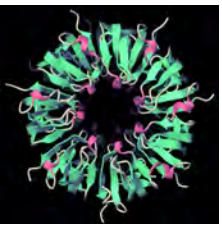
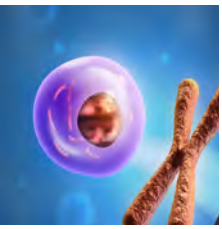
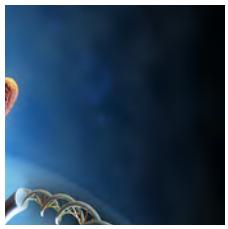
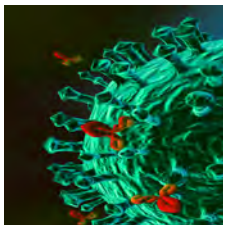
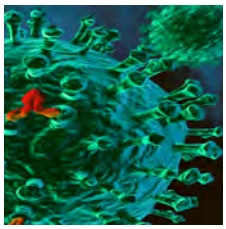
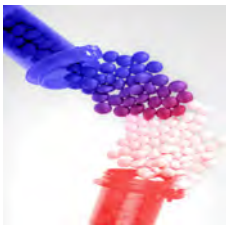
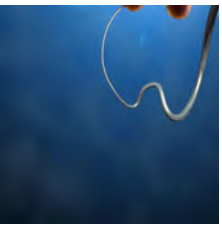
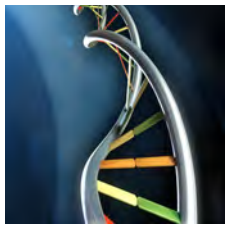
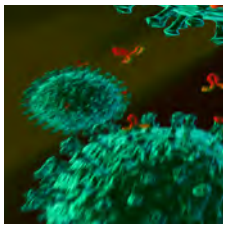
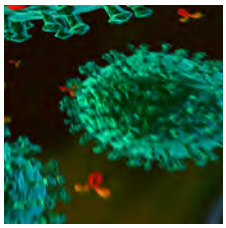
Scientific



Our Solutions for Protein Analysis

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JOBIN YVON
Technology

Solutions for Protein Characterization

Kinetics

Identification

Detection

Function

Proteins are involved in many critical roles in the body:

Enzymes - allow chemical reactions to go faster

Antibodies - aid the immune system to fight disease

Fibrinogens - form blood clots to stop bleeding

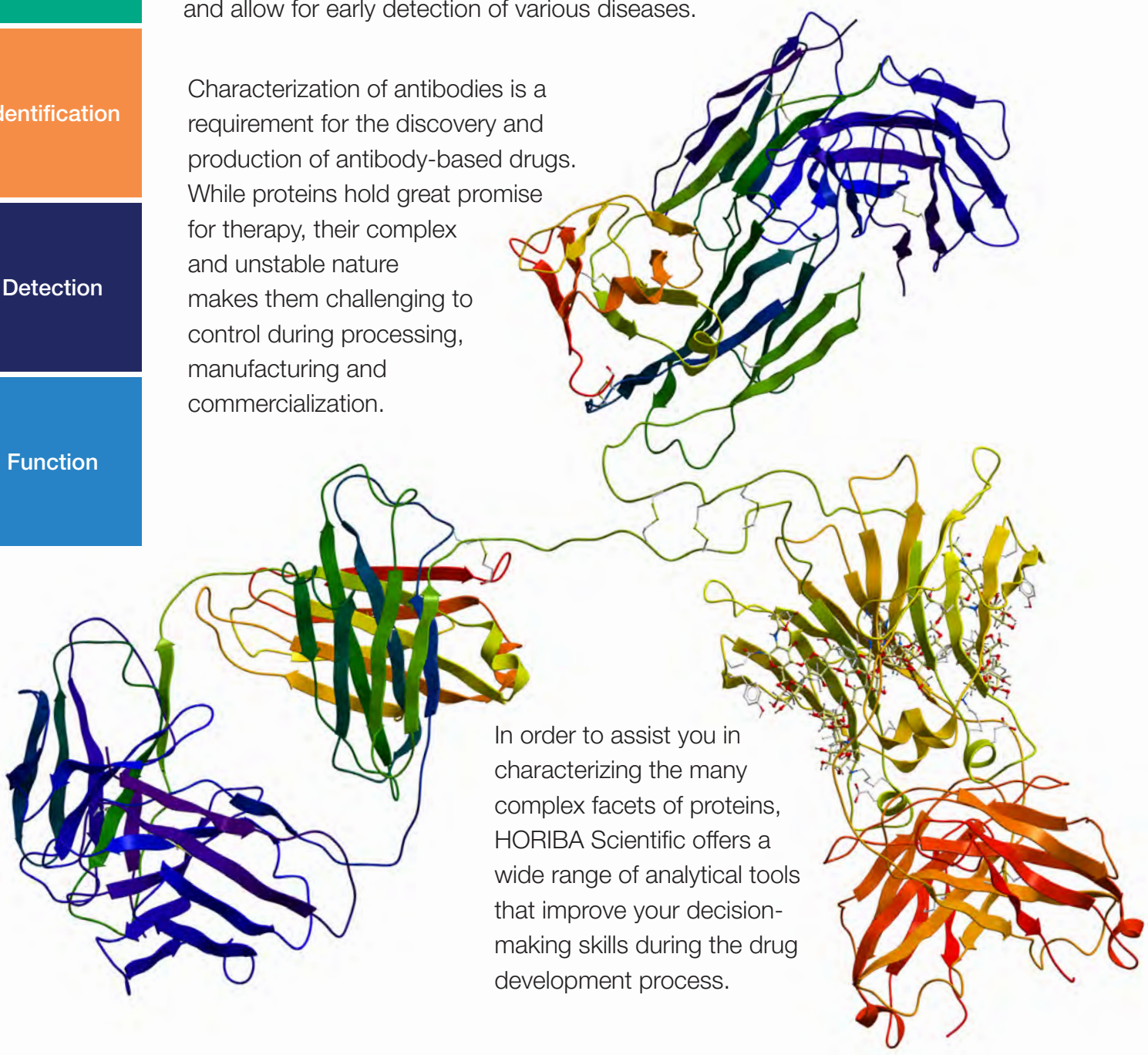
Chemotaxis - are proteins that transport molecules from one location to another

Collagen - maintains structure and supports cells and organs

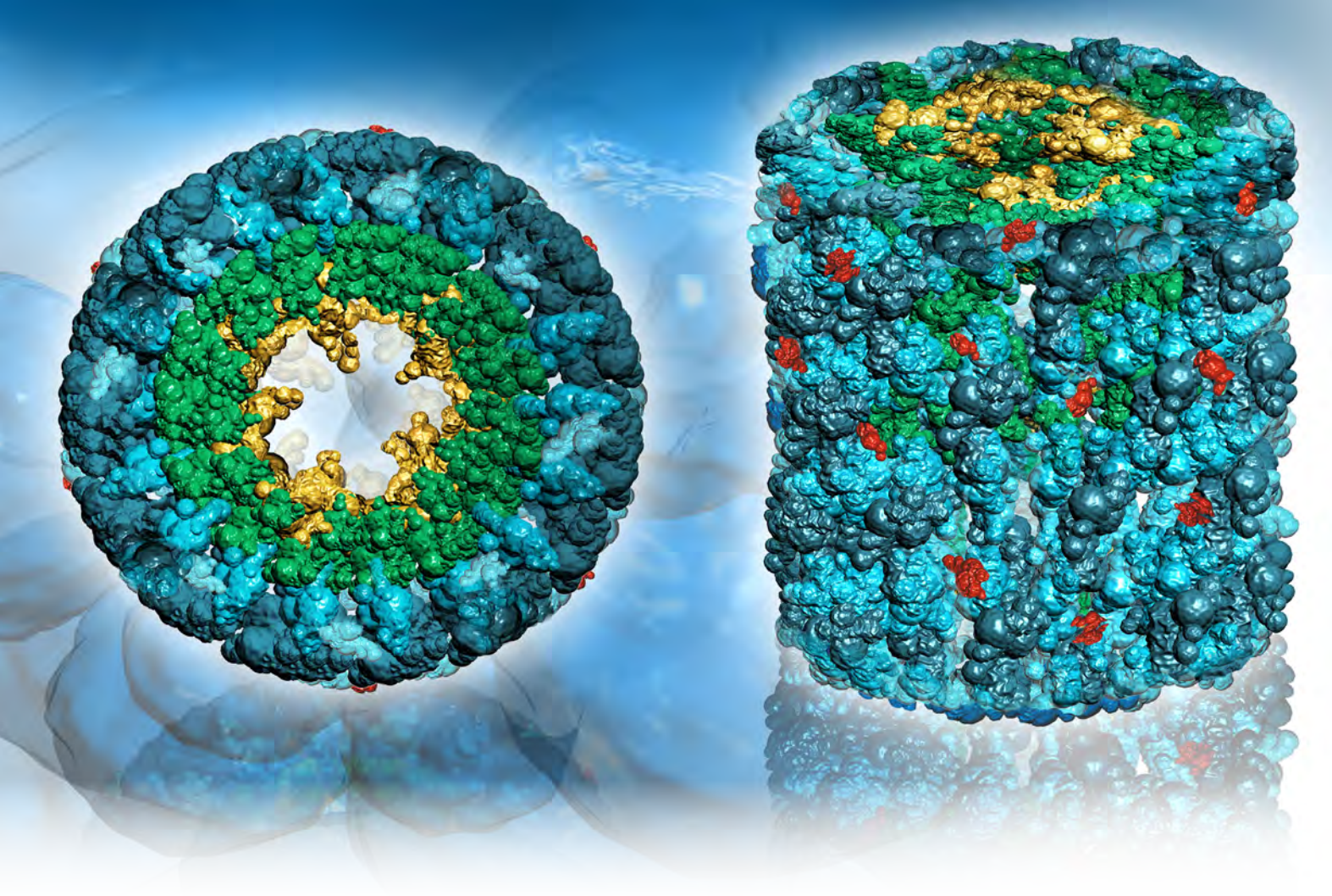
Myosin and Actin - present mainly in muscle tissue to facilitate physical movement

Biomarkers - found in biological fluids, help in drug target identification, drug response, and allow for early detection of various diseases.

Characterization of antibodies is a requirement for the discovery and production of antibody-based drugs. While proteins hold great promise for therapy, their complex and unstable nature makes them challenging to control during processing, manufacturing and commercialization.



In order to assist you in characterizing the many complex facets of proteins, HORIBA Scientific offers a wide range of analytical tools that improve your decision-making skills during the drug development process.



Protein Degradation Pathways

- Monitor secondary structure changes (XploRA, Aqualog)
- Size distribution (ViewSizer 3000, SZ-100)
- Aggregation (XploRA, ViewSizer 3000, SZ-100)
- Surface Charge (SZ-100)

Protein Function

- Ranking (XelPleX)
- Detailed binding kinetic data (XelPleX, Aqualog)
- Drug activity within complex disease models (XploRA)
- Intracellular visualization of biomolecules (XploRA)

Protein Detection and Identification

- Protein concentration (Aqualog)
- Cellular and Tissue distribution of proteins (XploRA)
- Ligand fishing (XelPleX)
- Immunoassays (XelPleX)
- Complex sample analysis (XelPleX)
- Protein Synthesis (Aqualog)

Raman

XploRA

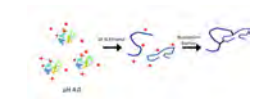
Label-free, nondestructive characterization of proteins with sub-micron spatial resolution. Raman is being used for both protein secondary and tertiary structure analysis, as well as monitoring agglomeration and characterization of particle contamination in line with USP 766 and 788.

Application:

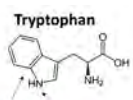
Protein stability

Solutions of lysozyme under conditions known to affect its physical state were measured using a cuvette liquid cell in order to investigate the potential of Raman spectroscopy as a non-invasive and label-free tool to assess protein formulations' stability.

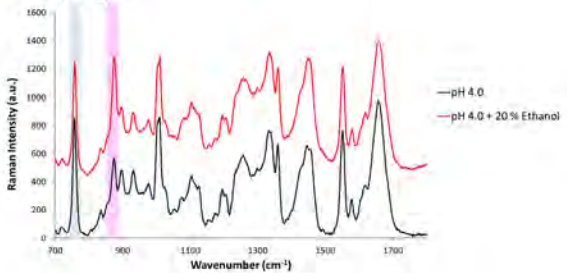
Ethanol Effect



Tryptophan



Sample	I_{877}/I_{760} Ratios	Raman Bands
pH 4.0	0.60	760 cm^{-1} band (indole ring of Trp) [3]
pH 4.0 + 20 % Ethanol	1.02	877 cm^{-1} band (N_1-H site of the indole ring)[3]
Increase in relative intensities of the I_{877}/I_{760} ratios suggests an environmental change around the Trp moiety as a result of the addition of ethanol.		



Results from this study identified specific Raman signature bands in this sample that can be used to highlight individual amino acid residues whose spectra respond to structural changes in proteins.

Surface Plasmon Resonance Imaging (SPRi)

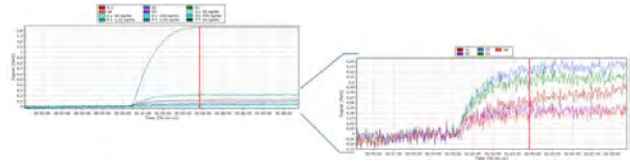
XelPleX

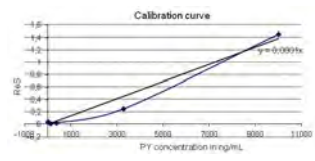
Multiple candidate molecules (antibodies) can be immobilized in a matrix format onto the sensor chip, and fully characterized in terms of affinity and kinetic rates. Full kinetic profiles are obtained within minutes, allowing you to make fast decisions with your antibody scouting analysis.

Application:

Protein detection in complex samples

The analyte in this study is a protein that is commonly used as an AIDS diagnostic tool, in combination with other immunological tests. Consequently, rapid and high throughput quantification solutions are required in the pharmaceutical research area. The protein of interest can be detected and quantified in different supernatants with only a single injection using the XelPleX system.

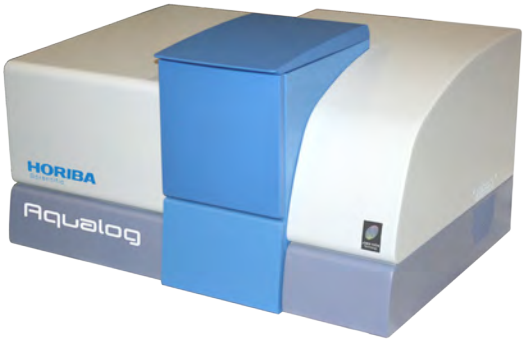




Sample	PY concentration in µg/mL
Supernatant 1	0.73
Supernatant 2	1.36
Supernatant 3	1.09
Supernatant 4	0.44
Supernatant 5	0.42

Five different supernatant samples, as well as the pure protein for the calibration curve, were spotted directly on a single SPRi chip. The figure above shows the averaged and reference-subtracted response after the injection of the secondary antibody at 100 nM. It mentions also the quantification of the protein from the 5 different supernatants based on the calibration curve.

Fluorescence



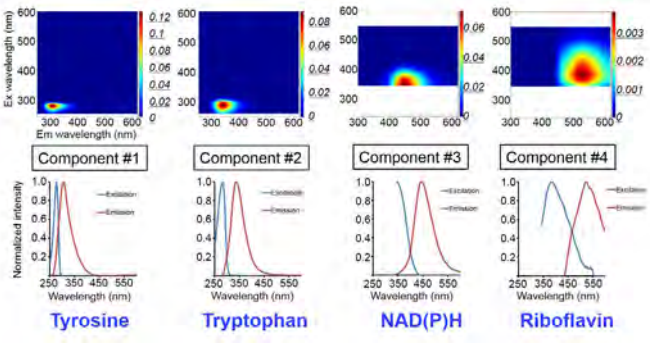
Aqualog

The Aqualog offers fully patented technology combining UV-Vis and fluorescence Excitation-Emission Matrices (EEMs). The system corrects for Inner Filter Effects (IFEs) using a patented design that provides a unique molecular fingerprint for samples such as vaccines, cell culture media and proteins.

Monitoring cell culture media conditions is highly important for pharma industries in order to improve cell proliferation for applications such as protein synthesis. Various chemical components of the medium have fluorescence characteristics, and thus EEMs measurement is well suited to measure several components simultaneously.

Application:

Monitoring cell media culture conditions



Parallel Factor Analysis (PARAFAC) score of NAD(P)H increased continuously during the cell proliferation. The result shows that the NAD(P)H is a key fluorescence indicator of the culture medium condition and cell proliferation. NAD(P)H is known to correspond to changes in cell environment.

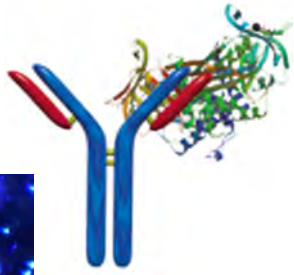
Particle Analysis

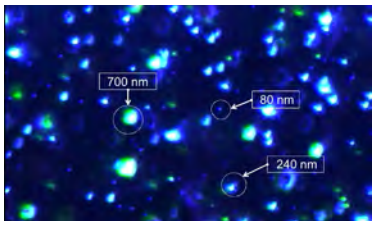
ViewSizer™ 3000 / SZ-100

Protein aggregation can be quantified by monitoring particle size distribution with several tools, including the ViewSizer 3000 and SZ-100. Aggregation can be readily quantified, even for aggregates significantly larger than the individual protein molecules. The ViewSizer 3000 analyzes numerous individual particles with sizes from 10 nm to 2 microns, permitting unprecedented resolution of size distribution, particle counting, and particle visualization.

Application:

Aggregation, Size





Single frame of video showing ability to visualize a wide range of sizes simultaneously. Rapid and accurate particle size distributions are obtained via this particle-by-particle analysis.

HORIBA Scientific, Your Lab Partner for Protein Analysis

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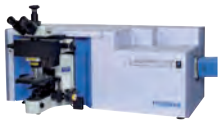
Drug Ranking

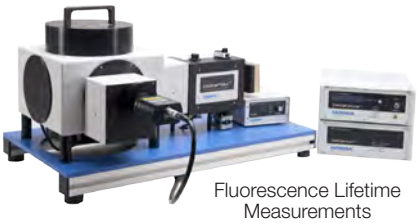


Drug Activity

pH Analysis

Protein Conformational Changes

Size Distribution of Active Ingredients and Excipients



Fluorescence Lifetime Measurements

FRET Studies

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