Salient Characteristics & Minimum Technical Requirements

High-Performance Fluorescence Spectrophotometer System

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1. General System Requirements

- **System Type:** The instrument must be a comprehensive fluorescence spectrophotometer (fluorimeter) capable of measuring fluorescence, phosphorescence, chemiluminescence, and bioluminescence without requiring hardware changes.
- **Light Source:** Must utilize a Xenon flash lamp (or equivalent) capable of pulsing at a high frequency (e.g., 80 Hz or faster) to prevent sample photodegradation.
- **Room Light Immunity:** The system must feature room-light immunity in fluorescence mode, allowing users to accurately measure samples or operate accessories without closing the sample compartment lid.

2. Optical and Performance Specifications

The instrument must meet or exceed the following optical and performance criteria to ensure high-sensitivity measurements and reproducible spectral data.

Parameter	Minimum Technical Specification Requirement
Wavelength Range	Operational range of at least 200 nm to 900 nm (mechanical range of 190 nm to 1100 nm) for both excitation and emission.
Sensitivity (SNR)	• > 4,000:1 RMS for the Raman band of water at 350 nm excitation (1-second signal averaging time, 10 nm slits). • > 1,400:1 RMS for the Raman band of water at 500 nm excitation (1-second signal averaging time, 10 nm slits).
Detectors	High-performance photomultiplier tube (PMT) detectors, including a separate PMT for the reference signal. Enhanced sensitivity capabilities for measurements above 700 nm.
Wavelength Accuracy	± 0.5 nm or better.
Wavelength Reproducibility	± 0.1 nm or better.
Scanning Speeds	Maximum scan rate and maximum slew rate of at least 24,000 nm/min.
Spectral Bandwidth	Software-selectable excitation and emission bandwidths (slits) ranging from at least 1.5 nm up to 20 nm.
Filters	Integrated, software-selectable optical filters (bandpass and cutoff filters) for both excitation and emission.

3. Sample Handling and Accessories

- **Solid Sample Analysis:** The system must include a solid sample holder accessory kit that allows for edge mounting and can accommodate powder cells, single crystals, and standard 12.5 × 12.5 mm cuvettes.
- **Temperature Control:** The system must support precise thermal regulation through the following components:
  - A water-thermostatted single-cell holder.
  - An integrated Peltier thermostatting system (or equivalent precise solid-state temperature control) for the cell holder.
  - A compatible water pump (110 V with a standard US plug) to support the thermostatted accessories.

4. Data Collection and Software

- **Workstation:** The system must include a compatible desktop PC pre-loaded with the necessary instrument control and data analysis software.
- **Software Capabilities:** The software must allow for automated control of the instrument, accessories, and temperature.
- **Data Collection Rates:** For kinetics studies, the system must be capable of data collection rates up to 4,800 points/minute for a single cell.
- **Signal Averaging:** Must support variable signal averaging times (e.g., from 0.0125 seconds to > 900 seconds for fluorescence; microsecond to 10-second gate times for phosphorescence and bio/chemi-luminescence).

5. Additional Services and Support

- **Warranty:** The system must include a minimum 12-month standard commercial warranty from the date of acceptance.