Specifications for an Imaging Triple Spectrometer/NIR Linear Array

The Naval Research Laboratory (NRL) has a requirement for an Imaging triple spectrometer/ NIR Linear Array digital camera system. This system should be suitable for micro-Raman, micro-Photoluminescence and micro-Photoluminescence-Excitation of single semiconductor quantum dots as well as macro semiconductor samples. Therefore it must have high straight light rejection, high throughput, high resolution and imaging capabilities. Due to the variety of experiments to be performed with this system it has to be highly versatile allowing it to be used as a single, double or triple spectrometer. It needs to work on a variety of spectral ranges and windows which means that the gratings have to be easily interchangeable.
The system must consist of the following components and shall meet or exceed the following minimum-specifications.

NIR Linear Array

a. 512(wide)x1(tall) array, 25(wide) x50(tall) μm pixels.
b. Response from 0.8 to 1.7 μm with 80% quantum efficiency
c. Liquid nitrogen cooled for low dark noise (0.5 counts/pixel/second).
d. Software selectable amplifiers.
e. Electronic Shutter
f. High spectral data rate (1800 spectra/ second)
g. Easy integration to the spectrometer.
h. User friendly software fully integrated with the software of the spectrometer and capability of controlling it through Labview.
i. USB 2.0 controller
j. Dynamic range 16 bits
k. Response uniformity 10%

Triple Spectrometer

a. Two output ports. One for the NIR Linear Array and the other one for installing in the future a Visible cryogenically cooled CCD for covering the range between 400 nm and 1.7 μm.
b. Two input slits (or one input slit and a periscope system).
c. Slit shutter computer controlled.
d. Capabilities of using the spectrometer as triple additive, double, or single.
e. All three stages must be able of being controlled independently from each other.
f. High spectral resolution, when combined with the NIR Linear array it should be 0.1 cm^{-1} at 1064 nm.
g. Imaging capabilities (Astigmatism 100 microns at the focal plane).
h. Silver coated mirrors and gratings for high throughput in the 0.8 to 1.7 μm region.
i. Three sets of interchangeable gratings (9 gratings total) to provide desired spectral windows (switch able from 450cm^{-1} to 50cm^{-1} across the CCD) with proper blazed angles.

j. User friendly software capable to correct (i.e., calibrations) for different setups with different grating selections.
k. Capability of controlling the spectrometer with Labview.
l. Capability of controlling the spectrometer with a laptop.

Installation and Training

a. The price of the spectrometer/NIR camera should include installation at NRL, Washington DC. Installation shall include a demonstration that the instrument is in compliance with the specifications.
b. The price of the spectrometer must include delivery of the instrument to NRL, Washington DC.
c. At the completition of the installation and demonstration, the successful offeror should provide on-location training at NRL.

Documentation and warranty

a. A full set of all written documentation customarily provided to the public with a commercial item shall be provided. This shall include users manual(s) or equivalent as well as copies of any software, and any manuals for the software included with the system, if customarily provided. This documentation should be received by NRL with the system hardware, unless other arrangements are agreed to by the authorized Government representative. In addition to the above documentation which is customarily provided.
b. The contractor shall offer the Government at least the same warranty terms, including offers of extended warranties, offered to the general public in customary commercial practice. These warranty terms must be included in the system price. The period of the warranty shall begin upon acceptance.