



Hungary-Romania
Cross-Border Co-operation
Programme 2007-2013

Two countries, one goal, joint success!

European Union
European Regional Development Fund



**“Realization of Hungarian-Romanian R&D Laboratory for the
Development of Major Projects in Polluted Terrain Cleaning”
HURO/0802/100**

Modular measuring suite - an innovative optical sensing solution

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Jaz Modular Spectroscopy

- Jaz® – an Ocean Optics product – is a modular measuring suite.
- Jaz is a community of stackable, modular and autonomous instruments that combine to create the ultimate in smart sensing for lab, field and anywhere your work takes you.
- Jaz is unfettered by the limits of traditional optical sensing instrumentation. Its unique features and expandable platform make it uniquely suited for field applications, remote sensing, process flow, quality assurance and more.
- Jaz brings an unparalleled level of flexibility, with its replaceable slits.



inventors of the world's first miniature spectrometer



Jaz Modules

Module	Description
JAZ-S*	Spectrometer and grating
JAZ-DPU	Processor (CPU), OLED display and keypad
JAZ-E	Ethernet and memory module. Includes one slot for an SD card (up to 2 GB).
JAZ-B	Battery (lithium-ion) and memory module. Includes two slots for SD cards (up to 2 GB each).
JAZ-PX	Pulsed Xenon light source
JAZ-UV-VIS	Deuterium-tungsten halogen light source (maximum 1 if stack is powered by a battery, or more if each is individually powered)
JAZ-VIS-NIR	Tungsten-halogen light source
JAZ-L640*	640 nm red LED
JAZ-L590*	590 nm yellow LED
JAZ-L450*	450 nm blue LED
JAZ-L405*	405 nm LED
JAZ-L365	365 nm UV LED
JAZ-LWHITE*	White LED
JAZ-NEOFOX	NeoFox Sport oxygen sensing module for measuring oxygen partial pressure and dissolved oxygen. Maximum one per stack.
JAZ-INDY	Industrial module for RS-232 and RS-485 communication. Also offers analog and digital outputs.
* Maximum 8 per stack	

Jaz Spectrometer Module

- Benchmarked to the performance standards of the USB2000+ Spectrometer
- 200-1100 nm Sony ILX511B CCD array detector
- Multiple gratings available

Jaz DPU Module

- 128 x 64 OLED display
- Choice of two screen/button orientations
- Embedded microprocessor for data processing
- Custom programmable scripting

Jaz Ethernet Module

- 100 Mbps, IEEE 802.3 compliant connectivity
- SD card slot
- Enables remote access via any computer on the same network
- Single-cable solution that provides PoE

Jaz Industrial Module

- Communicates with RS-232 and RS-485
- Provides analog and digital inputs/outputs

Jaz Battery Module

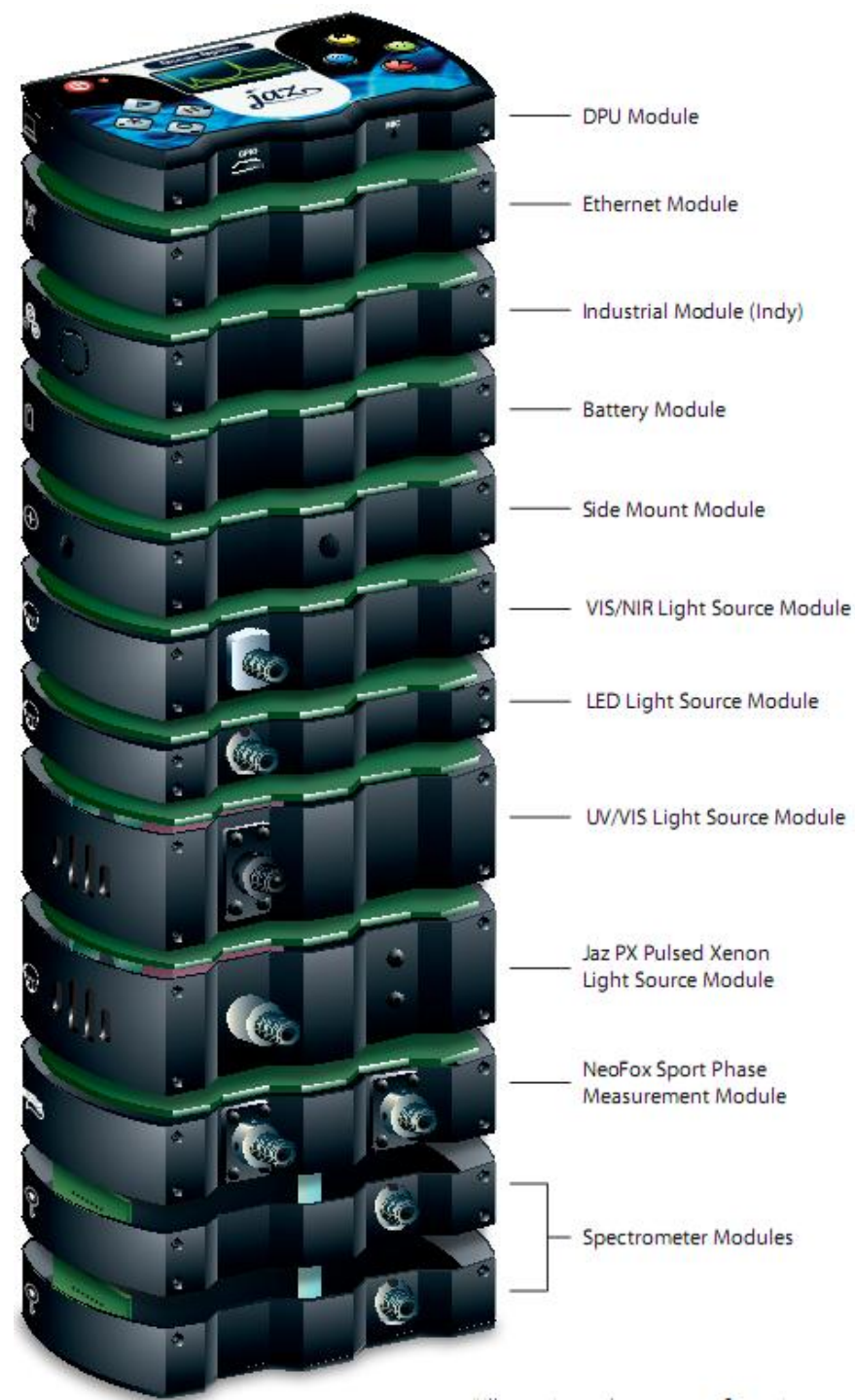
- Lithium-Ion battery for up to 8 hours of use
- Rechargeable from Ethernet, USB or external power supply
- 2 SD card slots for memory and other functions

Jaz Light Source Modules

- VIS-NIR Tungsten Halogen
- UV-VIS Deuterium-Tungsten Halogen
- Pulsed Xenon
- LED options

Jaz Side Mount Module

- Lets you affix Jaz to tripod, breadboard and more
- Has 1/4"-20 threaded mounts on three sides of the module

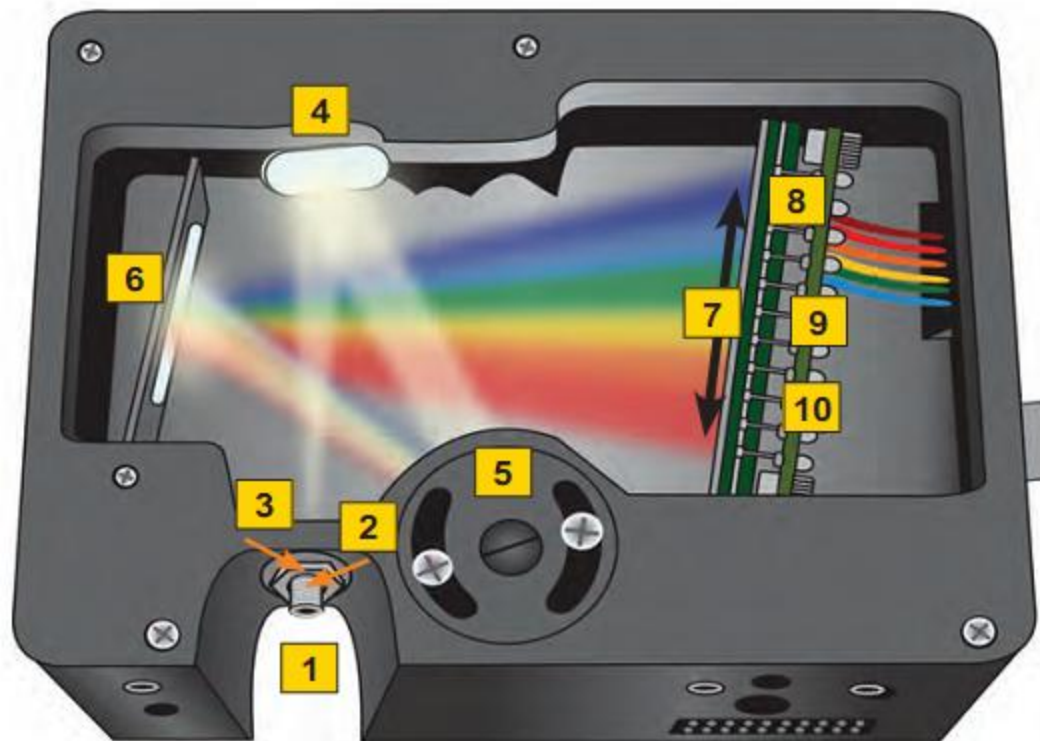


Features

- **Spectrometer Module**
 - Sony ILX511B 2048-element linear silicon CCD array detector
 - 14 grating options, UV through shortwave NIR
 - Responsive from 200 to 1100 nm
 - Maximum wavelength range 650 nm
 - Sensitivity of up to 75 photons/count at 400 nm; 41 photons/count at 600 nm
 - An optical resolution of ~0.3 to 10.0 nm (FWHM)
 - Integration times from 1 ms to 65 seconds
 - 16 bit, 3 MHz A/D Converter
 - 4 triggering modes
 - Embedded microcontroller allows programmatic control of all operating parameters and standalone operation
 - EEPROM storage for
 - Wavelength Calibration Coefficients
 - Linearity Correction Coefficients

USB User-Configured Spectrometers Overview

- | | | | |
|---|--|----|--|
| 1 | SMA 905 Connector | 6 | Focusing Mirror: specify standard or SAG+ |
| 2 | Fixed Entrance Slit: specify slit size | 7 | L2/L4 Detector Collection Lens: optional |
| 3 | Longpass Absorbing Filter: optional | 8 | Detector |
| 4 | Collimating Mirror: specify standard or SAG+ | 9 | OFLV Variable Longpass Order-sorting Filter |
| 5 | Grating and Wavelength Range: specify grating and starting wavelength | 10 | UV2/UV4 Detector Upgrade: optional |



Jaz DPU and Microprocessor Module

- The Jaz DPU module combines a powerful onboard microprocessor and 128 x 64 OLED display that delivers clear and vivid viewing of spectra in real time. This clever user interface features an intuitive menu-driven system and touchpad and is available in two orientations to ensure convenient operation. Its embedded microprocessor provides quick and reliable data processing and easily orchestrates up to 8 spectrometer modules for multipoint sampling.



JAZ-DPU-GPIO-2, JAZ-DPU-GPIO-R	
Module dimensions:	109.2 mm x 63.2 mm x 14.2 mm
Module weight:	90.72 g
Display:	OLED
Area:	128 x 64 pixels; orientation can be rotated 180°
Display lifetime:	55,000 hours
Keypad:	Push-button function
	Available in 180° orientation versions (standard and reversed)
	Power and charging indicator
	Contact switches lifetime of 200,000 contacts (minimum)
	Anti-glare ethyl-butyl-acrylate overlay material
	RoHS compliant
	Temperature range: -40 °C - +70 °C (storage) and 0 °C - +50 °C (operating)
Microprocessor	Blackfin® embedded microprocessor with data processing and storage capability
SDRAM:	64 MB
Power consumption:	~1-2 Watts

Jaz Ethernet Module

- The Jaz Ethernet Module turns your Jaz spectrometer system into a powerful network appliance. Use it to power your Jaz over Ethernet connectivity, access Jaz remotely or share data with others on your network. The 100 Mb/S Ethernet connection is a single-cable solution that powers the system and enables remote access by any node on your network or via the Internet. The Jaz Ethernet Module also includes a 2 GB SD card slot for instant data storage.
- A Jaz stack with an Ethernet Module has both USB and Ethernet port connectors, to connect the spectrometer to a computer via a USB port or to a network via a connection from the Ethernet port.

JAZ-E Ethernet Module	
Dimensions:	109.2 mm x 63.2 mm x 20.8 mm
Weight:	90.72 g
Data transfer rate:	100 Mbps
Power over Ethernet (PoE) standard:	IEEE 802.3-compliant 10/100
Data storage:	2 GB SD card (stores up to 100,000 spectra)
Ethernet cable:	14 ft. length, ferrite bead included for electronic noise suppression
PoE adapter (not included):	Recommend D-Link DWL-P50 or equivalent

Jaz Battery and Memory Modules

- The Jaz Battery and External Memory Module is built on a rechargeable Lithium-Ion battery that provides up to 8 hours battery life. It allows autonomous data collection with powerconserving sleep mode for long-term measurements. The Jaz Battery Module also includes two SD card slots for memory, applications and data storage. High-capacity SD cards (>2 GB) are not compatible with the battery module.



Jaz Battery Options	JAZ-B Battery Module
Battery type:	Lithium-Ion
Rechargeable:	Yes (via wall power or PoE)
Charging time:	When Jaz is off, 8 hours via USB and 4 hours via wall power and PoE
Charging current:	~4A @ 5V maximum w/wall plug adapter or 0.5A @ 5V through the USB port
Capacity:	14.8 Watt hours
Lifetime when combined w/ JAZ-COMBO (DPU + single-channel spectrometer):	~8-10 hours
Lifetime when combined w/ JAZ-COMBO and Light Source:	2 hours
Data storage via (2) SD card slots:	Yes
SD cards included:	Yes (2)

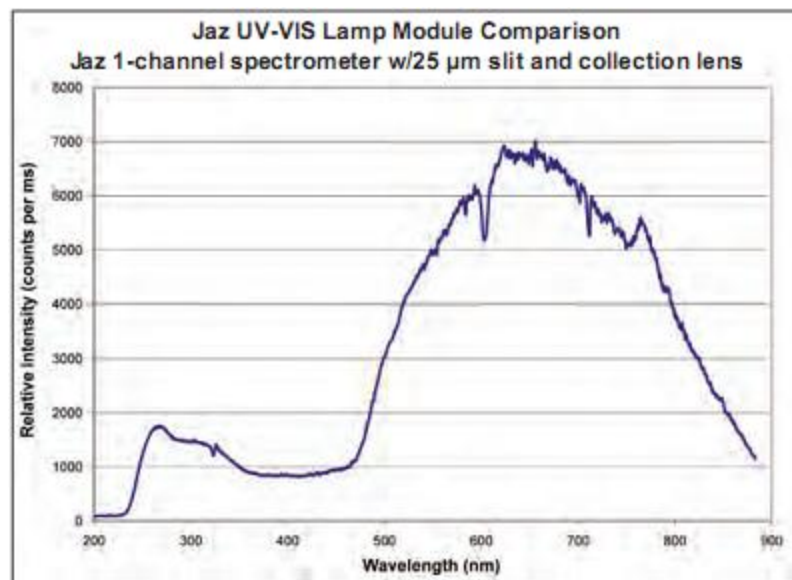
Jaz Light Sources

These compact, low-cost, modular light sources fit directly into the Jaz stack of appliances and feature outstanding bulb life as well as lower power consumption than comparable sources.

	Jaz-PX	Jaz-VIS-NIR	Jaz-UV-VIS	Jaz-LED
Dimensions:	109.2 mm x 63.5 mm x 31.8 mm	109.2 mm x 63.5 mm x 29.5 mm	109.2 mm x 63.5 mm x 26.7 mm	109.2 mm x 63.5 mm x 28.58 mm
Type:	Pulsed Xenon	Tungsten Halogen	Deuterium Tungsten Halogen	LED
Wavelength range:	190-1100 nm	360-1100 nm	210-400 nm (deuterium); 400-1100 nm (tungsten)	365 nm - White
Best for:	Absorbance, transmission, fluorescence and UV-VIS bioreflectance	Absorbance, transmission and reflection	Absorbance and transmission only	Excitation source for fluorescence, luminescence
Stability:	<1% flash to flash	Decay rate is ~0.01%/hour @ power setting of 1024 and 0.1%/hour at setting of 4095	After 30-minute warm-up, 0.3% peak to peak over 4 hours	+/-0.5% (typical short-term) after warm-up
Time to stable output:	10 flashes	~20 minutes	10 minutes (deuterium); 1 minute (tungsten halogen)	~30 minutes (~5 minutes for <3% drift for 470 nm LED)
Lamp life:	4 x 10 ⁵ flashes to 50% of initial intensity	>10,000 hours @ 1024 power setting; 500 hours @ 4095 power setting	~1500 hours (deuterium); 1500 hours (tungsten halogen)	>25,000 hours to 70% of initial intensity
Operating life in typical field setup:	~3 hours w/JAZ-COMBO and battery module	~6 hours w/JAZ-COMBO and battery module	~2 hours w/JAZ-COMBO and battery module	~25,000 hours to 70% of initial intensity (battery has negligible effect on LED life)
Power consumption:	4.5W	1W	7W	<0.2W
Operating temperature:	0 °C-+55 °C	0 °C-+55 °C	0 °C-+55 °C	-10 °C-+55 °C
Storage temperature:	-20 °C-+60 °C	-20 °C-+60 °C	-20 °C-+60 °C	-20 °C-+60 °C
Connector:	SMA 905	SMA 905	SMA 905 (recommended for use with 200 µm-600 µm fibers)	SMA 905
Certification:	CE Mark/RoHS	CE Mark/RoHS	CE Mark/RoHS	CE Mark/RoHS

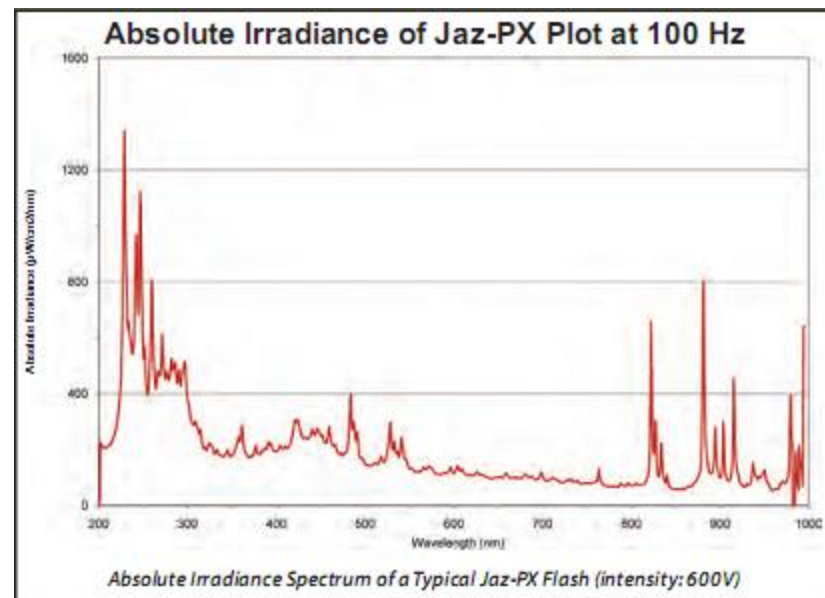
Jaz UV-VIS Light Source

- The JAZ-UV-VIS is a unique deuterium-tungsten halogen source with combined output from 210-1100 nm. The JAZ-UV-VIS is a continuous light source that is most effective for absorbance measurements in the deep UV and is not recommended for reflection measurements.



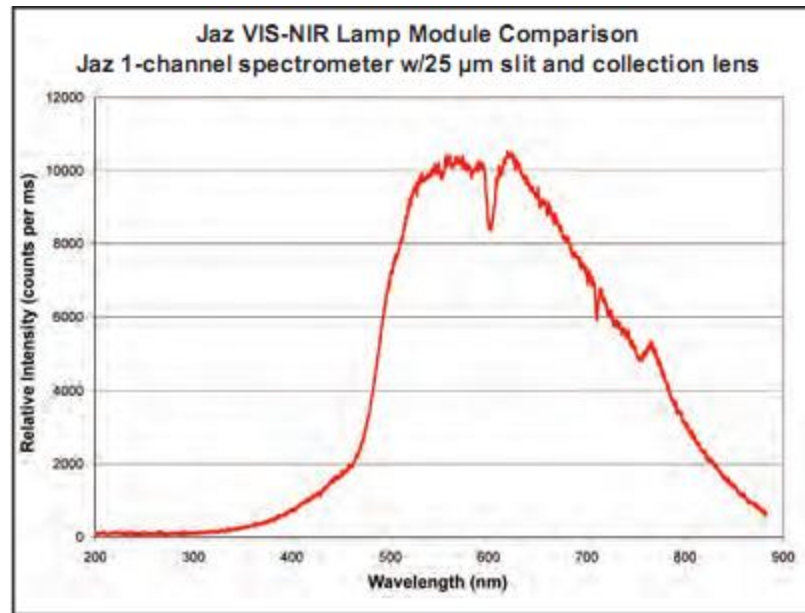
Pulsed Xenon Light Source for Jaz

- The Jaz-PX is a pulsed xenon light source for your Jaz modular sensing system. It features a pulsed, short-arc xenon lamp that is especially useful for UV-VIS applications such as absorbance, bioreflectance, fluorescence and phosphorescence. The Jaz-PX's lamp has a specified pulse frequency of 200 Hz (maximum 500 Hz) and spectral response from 190-1100 nm.
- Jaz-PX operates in both free-running and triggered modes, which allows its pulses to be coordinated with other devices in your Jaz stack.
- The Jaz-PX has an SMA 905 connector that couples to other Ocean Optics accessories, including optical fibers, cuvette holders, probes and other sampling optics.



Jaz VIS-NIR Light Source

- The JAZ-VIS-NIR Light Source is a Tungsten Halogen source that provides reliable coverage of 360-1100 nm and requires little power to operate. This small, lightweight source is perfect for absorbance, transmission and reflection. Additionally, it provides up to 10,000 hours of lamp life.



Jaz Industrial Communications Module

- - Experiments connect directly to Indy module for analog and digital I/O (8 I/Os available)
- - Enables Jaz to communicate with other devices via RS-232/RS-485 interfaces
- - Provides measurement and control for portable, laboratory and “light industrial” setups
- - Installs in Jaz stack and can be mounted to DIN rail or a wall (with special accessories) or anywhere with 1/4”-20 mount

The Jaz Indy is a multifunction module that allows the Jaz system to interface to industrial applications – in particular, RS-232 and RS-485 – and provides both analog and digital inputs/outputs. When combined with triggering capabilities and multichannel capacity, the Indy module makes Jaz an attractive optical-sensing option for multipoint sampling, reference monitoring and other applications in process and lab environments.



Jaz Software Options

- Although Jaz comes with its own basic software, additional processing power and functionality are available via several options:
- **SpectraSuite Spectrometer Software.** Our standard spectrometer operating software is ideal for post-acquisition processing of spectral data. For example, the user can capture data in Jaz software and save it to an SD card in the field, and then transfer the data to a PC in the lab for post-processing with SpectraSuite. This allows for more detailed analysis of your results. Included with every Jaz is Overture, a software program that provides basic spectroscopy functions such as absorbance, transmission and emission.
- **Applications Software.** Jaz applications are pre-loaded on an SD card and let you perform application-specific calculations on the Jaz display itself. The JAZ-A-IRRAD irradiance measurement application is a good example. Its post-processing mode can be manipulated to display parameters such as lumens, lux, PAR (Photosynthetically Active Radiation) and watts.
- **Development Software.** Much like our other spectrometers, Jaz can be used with software that you develop. Development tools range from a relatively simple but useful scripting tool conceived for nonprogrammers to a powerful application programming interface (API) recommended only for experienced C developers with a background in spectroscopy or who attend a Jaz API training session.
- **Jaz Scripting Language.** The Jaz Scriptor provides both programmers and non-programmers with an accessible, intuitive interface to Jaz spectroscopy functions. A script is simply a text file containing a sequence of operations to be performed. Some scripts relate to controlling data acquisition from Jaz, while others provide for analysis, transformation and presentation of spectroscopy data. With the Scriptor, you can automate basic tasks such as obtaining a spectrum, controlling a light source and spectrometer in the Jaz stack, manipulating spectral data and saving spectral data to a file for further analysis.
- **Jaz API.** The API is a sophisticated developer's tool conceived for use by experienced C programmers seeking to develop customized Jaz software for OEM and other applications. The API makes available a large number of commands for each device in the stack and enables interaction among those devices. A sample application is included. Consultation with an Applications Scientist and specialized training are required.

Interesting Applications

- Atmospheric monitoring of SO₂ & NO₂
- Investigating color vision in the marine environment
- Remote sensing of coral communities in the Western Caribbean
- Monitoring dissolved oxygen in marine and freshwater ecosystems
- Measuring the transmission and reflection of fish eyes
- Building electronic measurement networks for chemistry labs
- Demonstration of laser-induced breakdown spectroscopy
- Measuring optical properties of marine organisms
- Gathering spectral data on Mars
- Searching for signs of life in simulated Mars mission
- Considering membrane biophysics
- Measuring Optical Filter Transmission at the Cerro Tololo Inter-American Observatory (CTIO)
- "Smart" dust at the University of California, San Diego
- Analyzing the solar corona
- Light measurement systems and tools for spectroradiometry
- Star-gazing: Measuring the stellar output of the star Vega
- **More star-gazing: the University of Iowa's Rigel Observatory**
- Monitoring SO₂ Emissions from Volcanoes

**Thank you for your
attention!**