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## Calmar Laser's Cazadero Enables Unique Materials Research at National Light Source Facilities

**Sunnyvale, CA, March 14, 2011**--- Both the Stanford Linear Accelerator Facility (SLAC) and Lawrence Berkeley National Laboratory (LBNL) have selected Calmar Laser's Cazadero femtosecond fiber laser chirped pulse amplifier system for synchronized time-resolved experiments that reveal unique structural changes in novel material systems.

Calmar Laser, a leading developer and manufacturer of ultrafast fiber lasers, first introduced the Cazadero in 2005, primarily for precision materials processing applications in medicine and microelectronics manufacturing. However, within the research community there has also been significant interest in the system, which provides up to 20  $\mu$ J pulse energies at repetition rates up to a few MHz and a typical pulse width of less than 500 fs.

Professor Aaron Lindenberg at the SLAC facility indicated that, "We selected the Cazadero because of its turn-key, stable performance and compact size that enable convenient relocation of the system from one experimental beam line to another. The combination of high repetition rate and high energy, short pulses allows us to undertake picosecond time-resolved X-ray studies with excellent signal-to-noise". The Cazadero is operating at a repetition rate of 1.28 MHz and has been successfully phase-locked to the synchrotron 476 MHz RF signal with a timing jitter of less than 1 ps. The high energy output pulse of the fiber based system is used to induce a change in a material system of study, which is then interrogated at the atomic level by an X-ray pulse from the synchrotron. The approach is used to gain a better understanding of the excited state dynamics of nanocrystalline systems and how they differ from the corresponding bulk materials. Such insight could lead to more efficient next generation photovoltaic or biomedical materials.

At LBNL, Cazadero is enabling the development of a new light source known as the Next Generation Light Source (NGLS). In this case, the laser is again phase-locked but is used to irradiate a photocathode to produce "bunches" of electrons that are accelerated to high energy in an RF cavity. This system is being developed as the electron injector for the NGLS. The NGLS is a Free Electron Laser producing X-rays into the keV energy range and will be unique in operating at MHz repetition rate. Depending on the choice of photocathode material, the laser will operate at its fundamental 1030 nm wavelength, second harmonic, 515 nm, or fourth harmonic, 257.5 nm. Dr. Howard Padmore, Experimental Group Systems Leader, commented that, "The choice of the photocathode laser system is critical in the design of a machine devoted to support a user facility. We cannot tolerate any human intervention on a daily basis. The Cazadero is a unique system offering reproducible stable operation with a simple on/off switch. In addition, it provides all the key technical specifications such as power, repetition rate, and pulse duration for different types of cathode as well as frequency locking." The NGLS, high repetition rate, high brightness X-ray source will enable cinematic imaging of dynamics, determination of the structure of heterogeneous systems, and development of novel nonlinear X-ray spectroscopies.

Dr. Tony Lin, President and CEO, summarized, "Customer interest and demand for Cazadero have been very high and we are honored that this reliable source of stable, high energy, ultrafast optical pulses will play a prominent role in research activities at these prestigious laboratories. Our base system has been built for OEM applications but we offer a level of customization, such as phase-locking, flexible repetition rate, and wavelength or bandwidth tuning, to enable these innovative research studies".

### About Calmar Laser

Calmar Laser manufactures innovative fiber laser and fiber amplifier solutions for OEM, industrial, medical and scientific applications. Since 1996 Calmar has been a key supplier and reliable OEM partner to customers for advanced high-speed test and measurement applications, optical communications, component characterization, material diagnosis, transmission, biomedicine and micromachining. Today, Calmar is an industry leader in supplying



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robust, compact, ultrafast fiber lasers designed for simple hands-off reliable operation. For more information about Calmar Laser and product updates, visit the Company's Web site at <http://www.calmarlaser.com>.

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