High-Resolution Pulsed Optical Parametric Oscillator Laser System

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- Electrical Engineering
- Mechanical Engineering

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Spectroscopic analysis is an invaluable technique scientists use to break down molecules into their constituent atoms. A laser spectroscope works by firing a beam of single-frequency light at a sample. The electrons within the sample are excited and briefly jump to a higher energy level before emitting a photon, and falling back to the ground state. The spectroscope records the wavelength of the emitted photons and, because the energy gaps between electron orbitals are distinct from element to element, is able to atomically identify the sample. Current lasing systems must be able to constantly modulate the length of the reflecting cavity to ensure the reflected light is single frequency. This has been accomplished in the past by a fastidious and complicated piezo-electric circuit.

Purdue University researchers have developed a novel design for a pulsed optical parametric oscillator laser that is low cost and simple to construct. This design is a step forward in the field because it eliminates the need for reflecting cavity length modulation, simplifying laser fabrication and operation. The laser radiation from the system is single-frequency, which is important for increasing the accuracy and precision of a wide range of laser spectroscopic techniques.

Advantages:
-Less expensive than comparable lasers
-Simpler to fabricate and operate
-Increased accuracy in laser spectroscopic techniques
-The emitted laser radiation is single frequency•

Potential Applications:
-Identify suspicious materials in counter-terrorism operations
-Geological sample identification

-Historical painting restoration

People:

- Lucht, Robert P P (Project leader)
- Anderson, Thomas N
- Bougher, Thomas L
- Kulatilaka, Waruna D

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Contact OTC:

Purdue Office of Technology Commercialization
The Convergence Center
101 Foundry Drive, Suite 2500
West Lafayette, IN 47906

Phone: (765) 588-3475
Fax: (765) 463-3486
Email: otcip@prf.org