Small Business Innovation Research/Small Business Tech Transfer

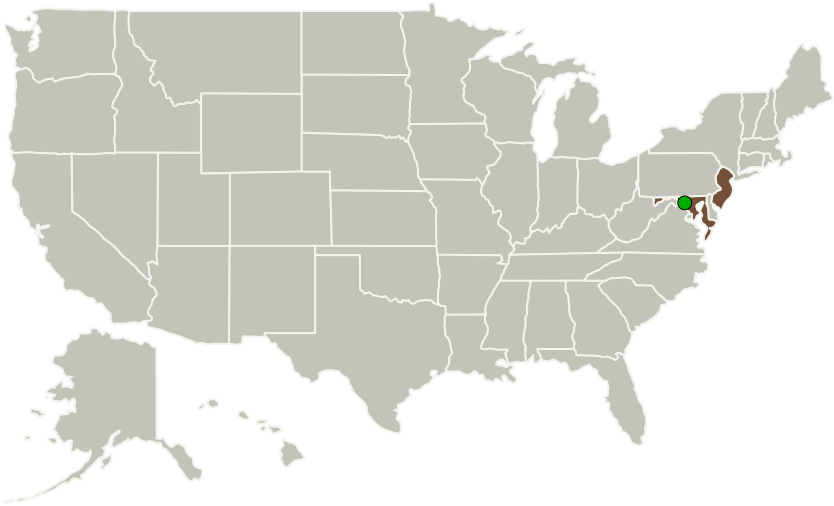
Efficient In-band Diode-pumped Q-switched Solid State Laser for Methane Detection, Phase II

Completed Technology Project (2013 - 2015)

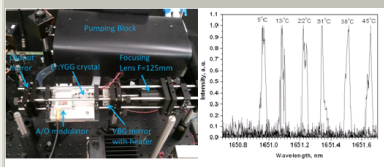
Project Introduction

We propose to develop an efficient, tunable Q-switched SSL operating at a wavelength of 1651 nm with pulse energy >1 mJ at 2000 Hz repetition rate with in-band laser diode pumping. We will leverage initial work carried out during Phase I of this program to pursue two approaches: (i) a tunable injection-seeded Q-switched SSL, and (ii) a regenerative power amplifier. In Phase I, we investigated a variety of gallium garnet gain media — including comprehensive characterization of absorption and fluorescence spectra — and we have identified the most promising prospective crystals for 1651 nm emission. We have also demonstrated sufficient tunability to enable differential path LIDAR techniques for the detection of methane.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Princeton Lightwave, Inc.	Lead Organization	Industry	Cranbury, New Jersey
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland



Photograph of Er-doped gallium garnet SSL prototype [left] and demonstration of tunable emission near 1651 nm [right].

Efficient in-band diode-pumped Q-switched solid state laser for methane detection

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Primary U.S. Work Locations	
Maryland	New Jersey

Project Transitions

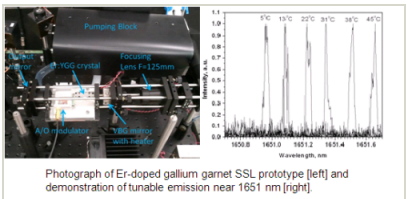
January 2013: Project Start

January 2015: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137310)*

Images



Photograph of Er-doped gallium garnet SSL prototype [left] and demonstration of tunable emission near 1651 nm [right].

Project Image
Efficient in-band diode-pumped Q-switched solid state laser for methane detection *(https://techport.nasa.gov/image/130124)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Princeton Lightwave, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

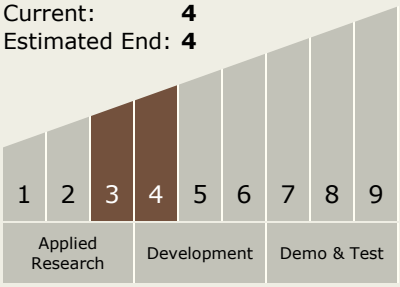
Carlos Torrez

Principal Investigator:

Igor Kudryashov

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  └ TX08.1 Remote Sensing Instruments/Sensors
    └ TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System