Ultra-Compact Trace Organic Chemical & Water/Ice Imager

PI: Photon Systems, Inc.

Target: Landers for Ocean Worlds, small Discovery/New Frontiers missions to primitive bodies, Dwarf planets, asteroids, planetary moons

Science:

- Enables ultra-miniature non-contact, reagentless, in situ instruments to detect trace organics, prebiotic and biological material, and water/ice
- Enables microscopic chemical imaging or mapping of the spatial relationship of organic and biogenic chemicals & water/ice embedded in mineral matrices

Objectives:

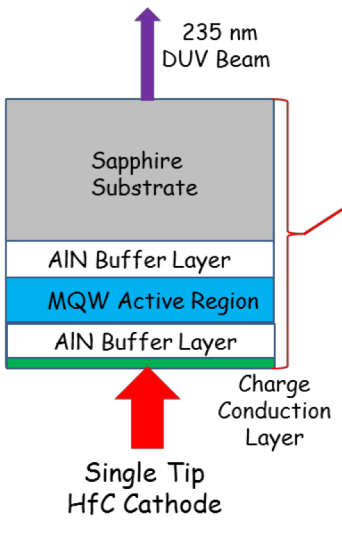
- Develop 1 cc, 235 nm, rad-hard, DUV-LET design
- Develop hermetic drive & control LET electronics
- Develop high efficiency DUV AlGaN emitter mat'l
- Develop improved AlGaN extraction efficiency
- Develop HfC cathode and mounting interface
- Perform environmental testing of integrated LET
- Perform life tests of integrated LET device

CoIs:

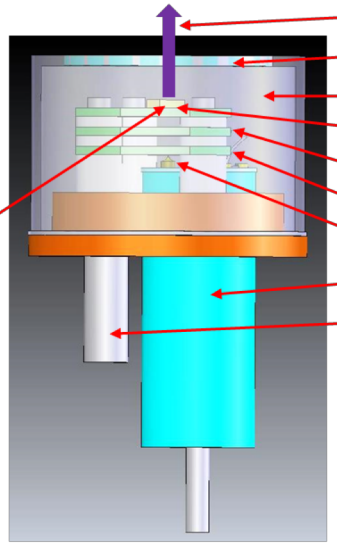
-Texas Tech Univ, Prof. Hongxing Jiang, Prof. Jingyu Lin;
-Photon Systems, Dr. Richard DeFreez;
-Applied Physics Technology, Dr. William Mackie, Dr. Bud Magera.

Deep UV Ebeam Pumped Light Emitting Triode (LET)

LET Schematic



LET Illustration



Specifications:

- 235 ± 5 nm emission wavelength
- 5 mW CW output power
- 100 micron emitter diameter
- 1 cubic cm LET volume
- 6 g weight
- 100 mW input power
- Radiation hardened

Key Milestones:

- Yr 1: Complete baseline LET design – 15 Dec. 2017
- Yr 1: Demo AlGaN chip & HfC cathode – 1 July 2018
- Yr 2: Complete integrated LET fab & debug – 1 July 2019
- Yr 2: Complete drive & control electronics – 1 Feb 2019
- Yr 3: Complete 2nd iteration prototype design & fab – 1 Dec 2019
- Yr 3: Complete environmental and life tests – 1 June 2020

TRL (entry 2) to (exit 4)