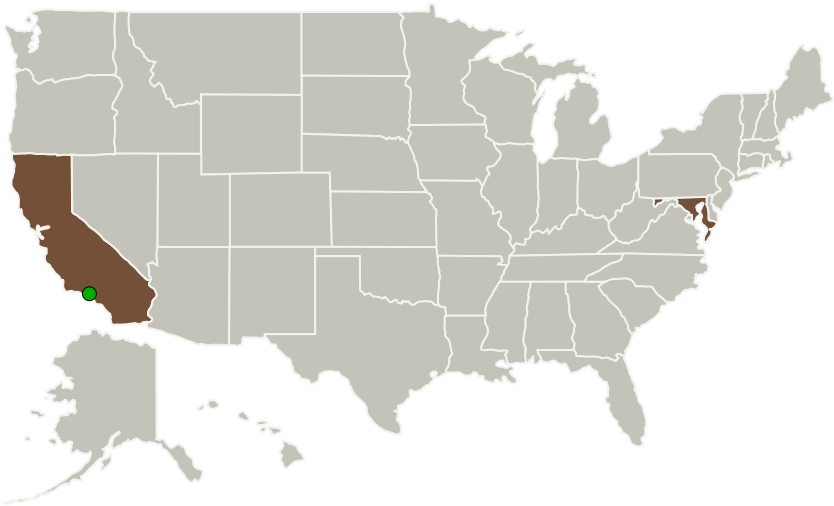
Very Long Wavelength Infrared Focal Plane Arrays for Earth Science Applications

Completed Technology Project (2018 - 2019)

Project Introduction

Very long-wavelength infrared (VLWIR) focal plane arrays (FPAs) needed for Earth Science imaging, spectral imaging, and sounding applications have always been among the most challenging in infrared photodetector technology due to the rigorous material growth, device design and fabrication demands. Future Small Satellite missions will present even more challenges for VLWIR FPAs, as operating temperature must be increased so that cooler (and radiator) volume, mass, and power can be reduced. By combining recent advances in type-II superlattice (T2SL) barrier infrared detector (BIRD), light-trapping resonator pixel concept, and high dynamic range (HDR) 3D Readout IC (3D-ROIC), we will demonstrate a cost-effective, high-performance breakthrough VLWIR FPA technology with significantly higher operating temperature and sensitivity than previously attainable, and with the flexibility to meet a variety of Earth Science thermal infrared (TIR) measurement needs, particularly the special requirements of Small Satellite missions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Lead Organization:

California Institute of Technology (CalTech)

Responsible Program:

Advanced Component Technology Program

Organizations Performing Work	Role	Type	Location
California Institute of Technology(CalTech)	Lead Organization	Academia	Pasadena, California
DRS Sensors & Targeting Systems, Inc.	Supporting Organization	Industry	Cypress, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
Leonardo DRS	Supporting Organization	Industry	Arlington, Virginia

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:

Pamela S Millar

Program Manager:

Amber E Emory

Principal Investigator:

Sarath D Gunapala

Co-Investigators:

Karen R Piggee
Thomas S Pagano
David Z Ting
Kwong-kit Choi
Arvind I D'souza
Christopher M Masterjohn

Technology Areas

Primary:

- TX08 Sensors and Instruments
  └ TX08.1 Remote Sensing Instruments/Sensors
    └ TX08.1.1 Detectors and Focal Planes

Target Destination

Earth