

This paper describes objective technical results and analysis. Any subjective views or opinions that might be expressed in the paper do not necessarily represent the views of the U.S. Department of Energy or the United States Government.

SAND2018-13184C

Exceptional service in the national interest

# Partnering with Sandia National Laboratories



Innovation from the Federal Labs – Opportunities for Commercial Space Industry

# SpaceCom 2018

Jon Chavez, National Security Partnerships  
Sandia National Laboratories

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.  
SAND 2018-XXXX

## SANDIA IS A FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTER (FFRDC)

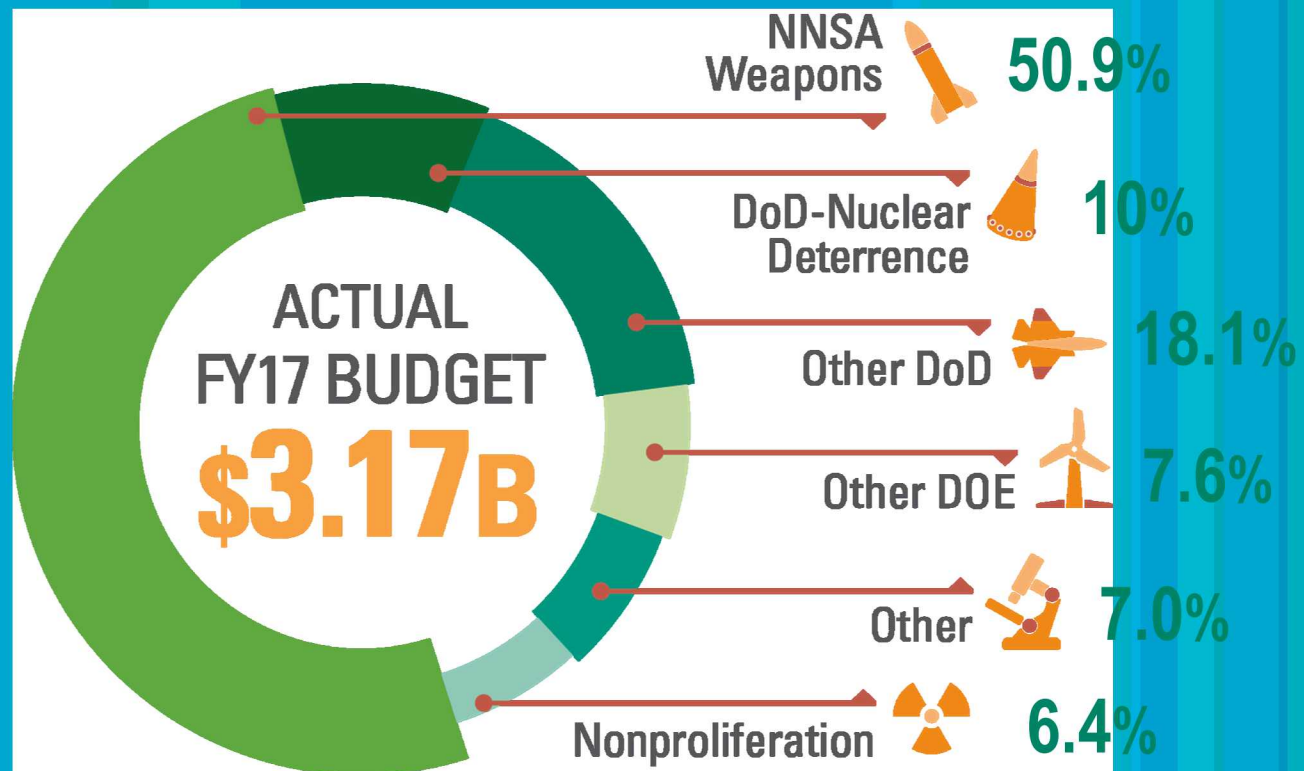
- Established in 1949
- History is traced to the Manhattan Project
- Nonnuclear component engineering
- Government owned, contractor operated





Sandia develops  
advanced technologies  
to ensure global peace

# SANDIA'S BUDGET COVERS A BROAD RANGE OF WORK



## OTHER

Department of Homeland Security  
Other federal agencies | Nonfederal entities  
CRADAs, licenses, royalties | Inter-entity work



## DoD

Air Force | Army | Navy  
Defense Threat Reduction Agency  
Ballistic Missile Defense Organization  
Office of the Secretary of Defense  
Defense Advanced Research Projects Agency  
Intelligence Community



## OTHER DOE

Science  
Energy Efficiency and Renewable Energy  
Nuclear Energy  
Environmental Management  
Electricity Delivery and Energy Reliability  
Other DOE



## NONPROLIFERATION

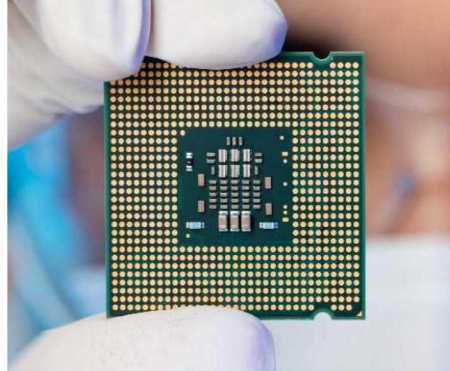
NNSA/NA20 | State Department

# SANDIA'S HISTORY OF SUCCESSFUL TECH TRANSFER



## Cleanroom

Sandia's invention of the original modern-day cleanroom led to \$50 billion worth of laminar-flow cleanrooms being built worldwide within only a few years.



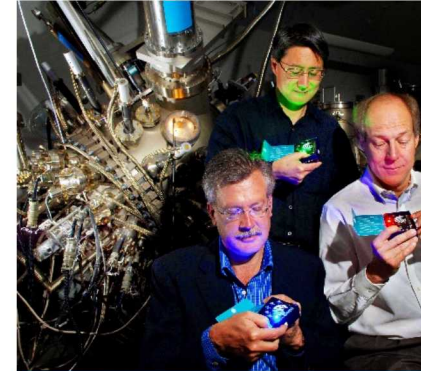
## Microelectronics & Semiconductors

Sandia helped revolutionize the semiconductor industry by licensing LIVA/TIVA, VCSEL, EUVL, and 3D-stacking technologies to some of the world's leading semiconductor manufacturing companies.



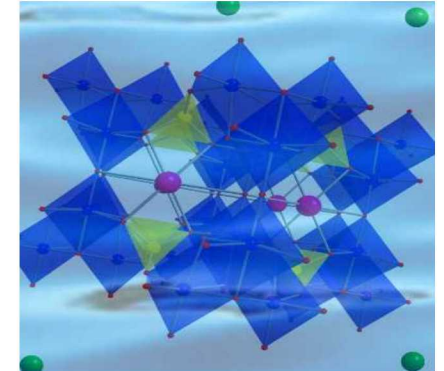
## Decon Foam

A Sandia-developed chemistry for neutralization of chem/bio warfare agents that was first used for the anthrax attacks of 2001, is now being used by multiple companies for rapid decontamination applications.



## Solid State Lighting

Sandia's early R&D of solid-state lighting has helped establish a global industry for LED/OLED technologies in which improved efficiencies could lead to \$120B in estimated annual global energy savings.



## Crystalline Silico-titanate (CST)

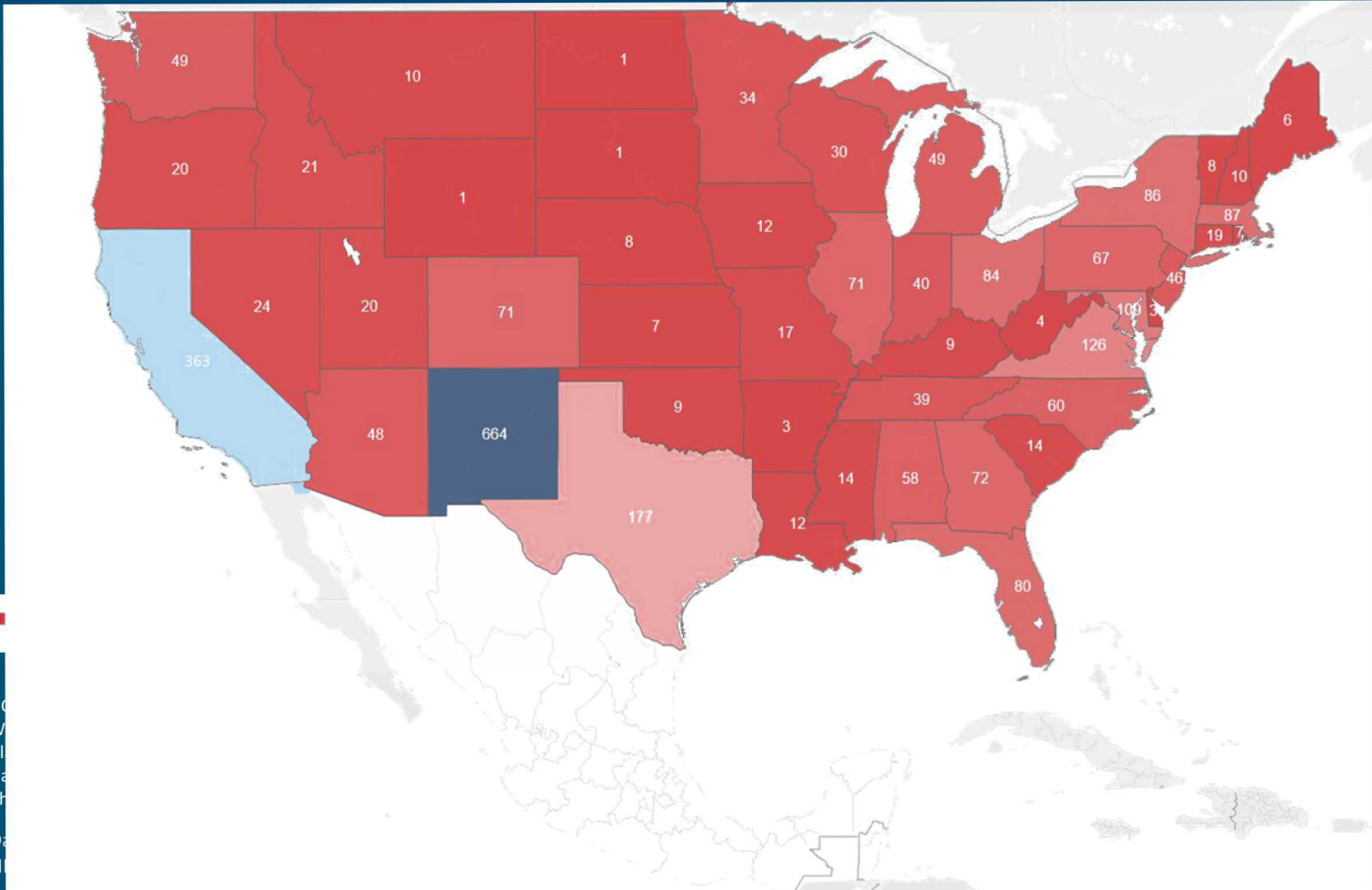
Sandia's CST technology was used by UOP, LLC to remove radioactive material from more than 43 million gallons of contaminated wastewater at Japan's damaged Fukushima Daiichi nuclear power plant.



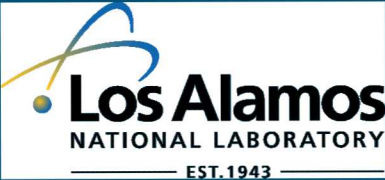
## Synthetic Aperture Radar (SAR)

Sandia has worked extensively with General Atomics to deploy Sandia's SAR systems for the US military and other customers. One version of the technology has been uncovering IEDs in Afghanistan and Iraq since 2009.

# PARTNERSHIPS REACH (FY17)

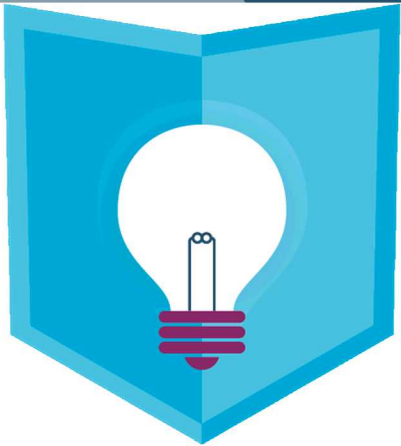


3,000+ agreements with partners in 50 states and many foreign countries



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## PARTNERING MECHANISMS

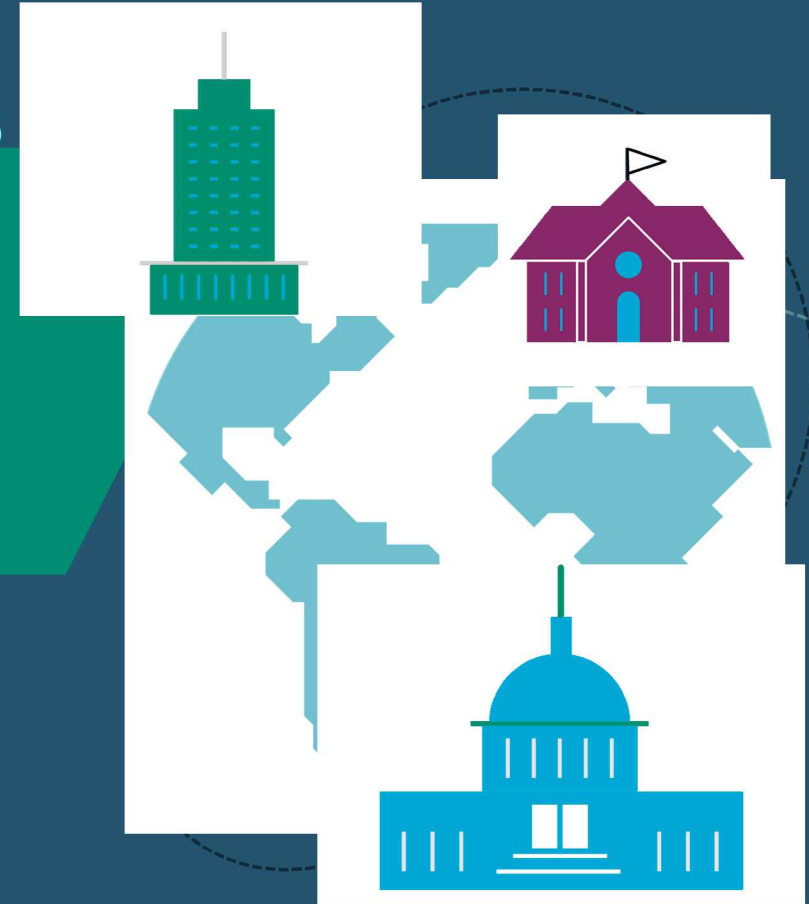


### Sandia Partnership Mechanisms

- LICENSES
- GUNS
- CRADAS
- SPP/NFE
- NMSBA

#### Marketing and Outreach

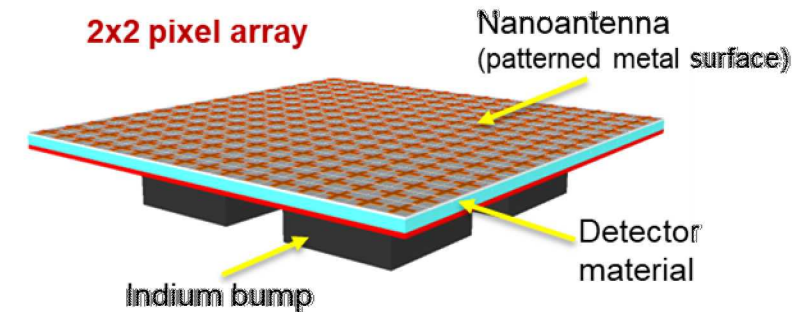
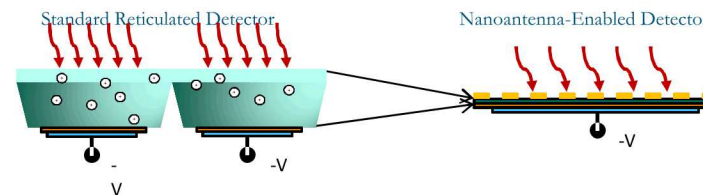
- Outreach to potential partners
- Federal Business Opportunities
- Listings on [ip.sandia.gov](http://ip.sandia.gov) & DOE EERE portal
- Conferences & Presentations
- Interactions with external parties



# NANOANTENNA-ENABLED DETECTORS

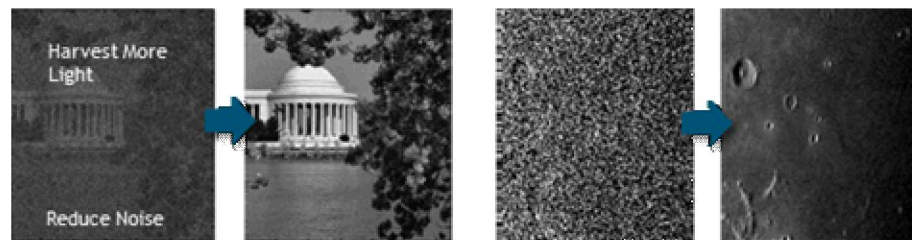
## New detector architecture that allows several advantages over state-of-the-art detectors

- Very thin detector material layer (by over 10x)
- High quantum efficiency
- Thinness should lead to better rad tolerance
- The pattern may be changed from pixel-to-pixel allowing adjacent pixels to have different spectral or polarization response
- Built-in A/R “coating”
- Angular & polarization insensitivity
- A foundation for tunability
- Can be used on any detector material

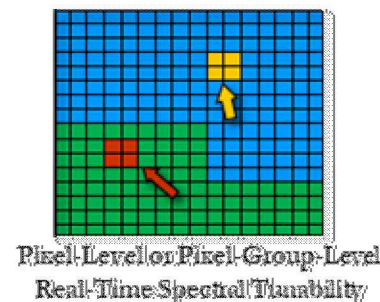


## IMPACTS

- See dimer objects with less noise than current state-of-the-art infrared detectors
- Track objects in the best spectral band with flexibility to adapt to new missions
- Change what each pixel can see in real time using graphene and other materials



Reduced Noise and Increased External Quantum Efficiency



Pixel-Level or Pixel-Group-Level  
Real-Time Spectral Tunability

For partnership opportunities contact, David Peters, Ph.D., [dwpeter@sandia.gov](mailto:dwpeter@sandia.gov).  
Learn more about Sandia's National Security Photonics Center (NSPC): [www.sandia.gov/mstc/nspc](http://www.sandia.gov/mstc/nspc).

Government Owned USPTO #: 8,452,134 8,750,653 and 8,897,609

# INFRARED TECHNOLOGIES

**Sandia National Laboratories has developed a suite of infrared technologies designed for various applications**

- Sandia's photodetectors are comprised of a semiconductor substrate and multiple semiconductor layers, and can be built using a variety of substrates
- Each photodetector contains a light-absorbing region that can be useful in individual devices, or layered together to form multiple focal plane arrays

**Sandia's Infrared Technologies portfolio consists of the following patents:**

- US 8,723,161 — Two-Color Infrared Detector
- US 8,450,773 — Strain-Compensated Infrared Photodetector and Photodetector Array
- US 8,022,390 — Lateral Conduction Infrared Photodetectors
- US 8,299,497 — Near-Infrared Photodetector with Reduced Dark Current
- US 7,755,079 — Strained-Layer Superlattice Focal Plane Array Having a Planar Structure
- US 8,293,566 — Strained-Layer Superlattice Focal Plane Array Having a Planar Structure
- US 8,907,439 — Focal Plane Array with Modular Pixel Array Components for Scalability
- US Patent Pending — Platform Focal Plane Array
- US Patent Pending — Precise Annealing of Focal Plane Arrays for Optical Detection
- US Patent Pending — Reversible Hybridization of Large Surface Area Array Electronics

## Potential Applications

- **Aircraft and aerospace**
  - **Microelectronics**
  - **Medical devices**
  - **Semiconductors**
- **Tactical military systems**

# ZERO-POWER RADIO RECEIVER

**Sandia has developed a miniature, zero-power radio receiver that can be easily integrated in a wide range of devices to provide continuous wireless connectivity**

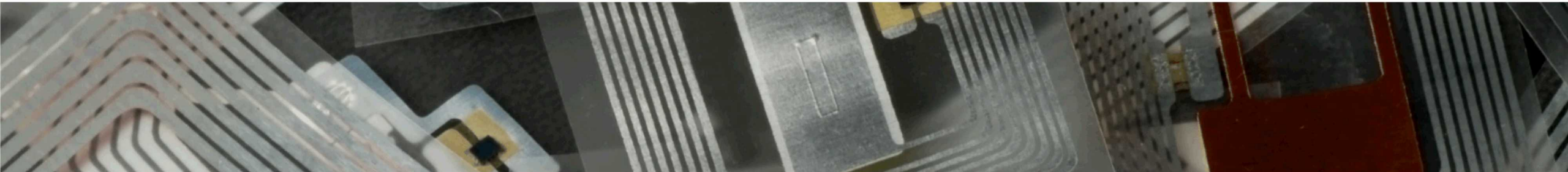
- Powered radio frequency electronics that are used in most wireless receivers can be replaced with electronics that require no power supply or battery
- Using this technology, a short range radio receiver (< 100m) can be built that uses no power other than the received RF signal
- The Zero-Power Receiver directly demodulates an amplitude modulated wake-up signal sent from a transmitter
- When incorporated into a cellular phone or GPS, it eliminates the need for the device to constantly power on and off waiting for contact—greatly extending battery life

## Technical Benefits

- Completely unpowered operation for short range receivers
- Ultra-low power for long range receivers
- Extremely wide input bandwidth

## Industries & Applications

Cellular Devices – Wearable Electronics – Home Automation –  
Automotive Control and Sensing – Biomedical Devices – Wireless  
RFID Tags – Animal Tracking Studies – National Security



# CONNECT WITH SANDIA

## Licensing:

Sandia National Laboratories offers different licenses to suit your needs. Our intellectual property may be licensed for commercial use (internal or commercial sale), test and evaluation, or execution of a government contract. One may also secure an option on a future license

## Visit [ip.sandia.gov](http://ip.sandia.gov):

- Search/browse technology profiles
- Contact the licensing/IP team

## Email:

- [partnerships@sandia.gov](mailto:partnerships@sandia.gov)

The screenshot shows the Sandia National Laboratories Intellectual Property Licensing Portal. The page features a navigation menu on the left with links to 'IP Home', 'Search/Browse Technology Portfolios', 'Licensing Overview', 'Ready-to-Sign Licenses', 'DOE SBIR TTI', 'Government Use Notices', 'News', and 'Contact Us'. The main content area is titled 'Licensing and Technology Transfer' and includes a large image of a person wearing safety glasses and purple gloves working with a complex electronic device. Below the image, there is a welcome message and a search bar for technologies available for licensing. A 'Featured News' section highlights 'Sandia's INNOVATION MARKETPLACE' with a graphic showing various technologies like wind turbines and solar panels. At the bottom, there are links to browse technologies by category, such as Bioscience, Energy & Environment, Materials, Chemistry, & Nanoscience, Computers & Information Science, Engineering Technologies, Microelectronics, Sensors, MEMS, & Photonics, Defense Systems & Assessments, and Homeland Security. A footer note mentions that users can search all Sandia energy related patents on this site and at the DOE.