



# Jefferson Lab Applied Technology

Thomas Jefferson National Accelerator Facility

www.jlab.org • 757-269-7100

operated by Jefferson Science Associates, LLC

## FEL Defense Uses

### Navy

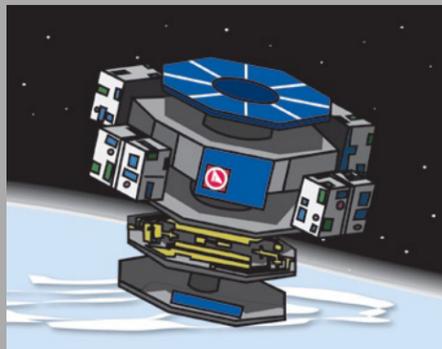


"An FEL is the only electrically powered device which offers the potential for MW power at any desired wavelength with inherently good bandwidth and unlimited run time. It will be the critical enabler of many ground-based, ship-based, and potentially space-based missions and applications."

-FEL report to the DOD Joint Technology Office, June 2001

Defend Navy fleets using infrared light

### Air Force



Fabricate ceramic components for miniature satellites using ultraviolet FEL light

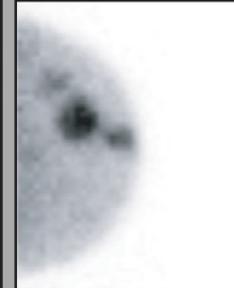
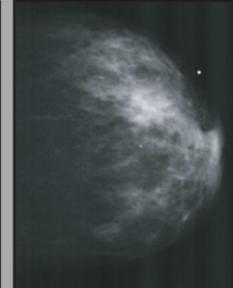
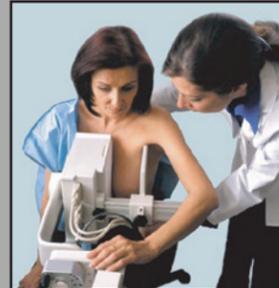
### Army



Evaluate the potential use of Terahertz light for applications such as land mine detection

## Medical Imaging Detector Uses

### Breast Imaging

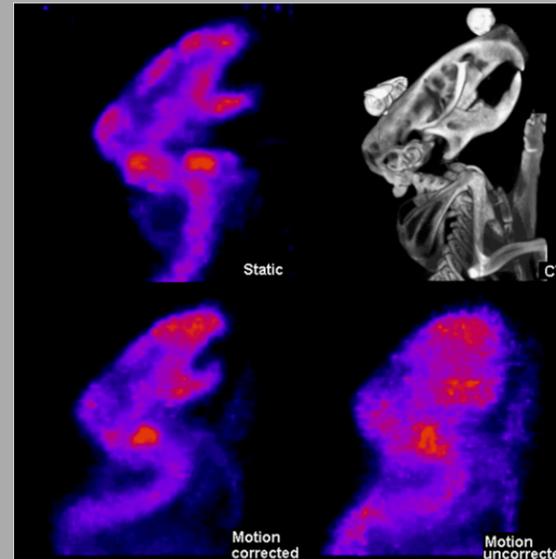


mammogram image

gamma-ray image

Some Jefferson Lab-developed patents are licensed to a small business, Dilon Technologies, as a diagnostic breast imaging tool to aid when mammograms are inconclusive and for high-risk patients.

### Small Animal Imaging



Thomas Jefferson National Accelerator Facility, Oak Ridge National Laboratory (ORNL) and Johns Hopkins University (JHU) have been collaborating on the development of a system for imaging in un-anesthetized, unrestrained mice. Basic research into human disease states and pharmaceutical development depend heavily on biomedical investigations involving animal models. But studies are limited by the necessity of using anesthetic and/or physical restraint during imaging. Jefferson Lab technology has been used in an awake animal study. Unique mouse brain studies of gamma-ray emitting molecules are now underway at JHU with this never before available technology. This methodology is now being extended to explore new ways to facilitate radioisotope imaging for plant biologists involved in bio-fuel and environmental research.

## FEL Medical Uses

### Light Therapy



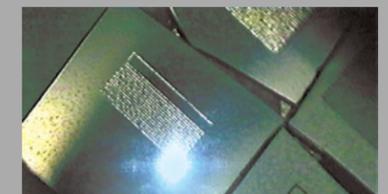
Investigate mechanisms for photodynamic cancer therapy

## FEL Industrial Uses

### Surface Processing

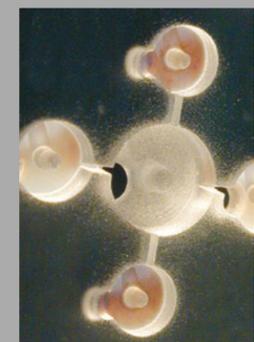


Laser glaze and anneal surfaces



Carburize and nitride surfaces

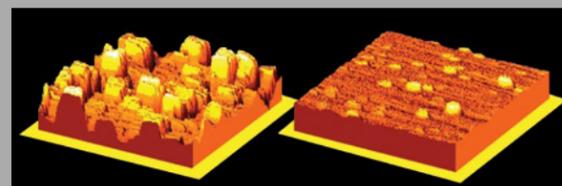
### Microfabrication



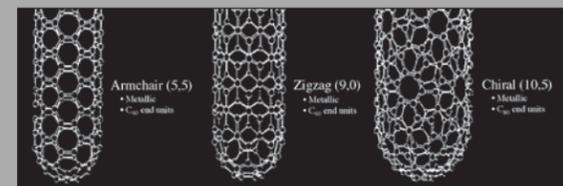
Create 3D patterns for Micro-Electro-Mechanical no dark Systems

## FEL Material Science / Nano Science Uses

### Electronic Materials / Nanotubes



High quality thin film production



Nanotube production

Create 3D patterns for Micro-Electro-Mechanical no dark Systems