JPL Introduction for Intersolar North America
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NASA’s Vision and Mission

- **NASA Vision:**
  - To improve life here;
  - To extend life to there;
  - To find life beyond.

- **NASA Mission:**

  *Previous*
  - To understand and protect our home planet;
  - To explore the universe and search for life;
  - To inspire the next generation of explorers as only NASA can.

  *Revised*
  NASA's mission is to pioneer the future in space exploration, scientific discovery and aeronautics research.

http://www.nasa.gov/about/highlights/what_does_nasa_do
We enable the nation to explore space for the benefit of Humanity. Our Mission is to:

1. Explore our own and neighboring planetary systems
2. Search for life outside the Earth’s confine
3. Further our understanding of the origins and evolution of the Universe and the laws that govern it
4. Make critical measurements to understand our home planet and help protect its environment
5. Apply JPL’s unique skills to address problems of national significance and security
6. Enable a virtual presence throughout the solar system by creating the Interplanetary Network
7. Inspire the next generation of explorers
JPL Is Part of NASA and Caltech

- Federally-Funded (NASA-owned) Research and Development Center (FFRDC)
- University Operated (Caltech)
- $1.5B Business Base
- 5,000 Employees
- 177 Acres (includes 22 acres leased for parking)
- 139 Buildings; 36 Trailers
- 673,000 Net Square Feet of Office Space
- 906,000 Net Square Feet of Non-Office Space (e.g., Labs)
Caltech Operates JPL for NASA

JPL is a NASA FFRDC and a Division of Caltech
JPL Funding Distribution for FY’12
Business Base = $1.5B

By NASA Office or Other Sponsor

- Science: 63.4%
- Space Technology: 14.1%
- Exploration: 11.2%
- Space Operations: 6.2%
- Other: 4.6%
- Reimbursable: 0.5%

By Implementing JPL Directorates

- Planetary: 27.3%
- Mars: 19.3%
- Astronomy: 13.9%
- Earth: 9.3%
- Interplanetary: 2.2%
- Other: 14.1%

NASA percentages based on FY’12 budget within the 2013 Office of Management and Budget (OMB) Submit dated 9/6/11
JPL Workforce by Job Classification and Academic Degree

- Staff composition by job classification for 4979 employees (4887 FTEs)
  - Business 16%
  - Business management 4%
  - Business support 7%
  - R&D management 8%
  - R&D support 2%
  - R & D 63%

- R&D staff distribution by academic degree for 3536 employees
  - Masters and Professional 33%
  - Doctorate 31%
  - Bachelors 27%
  - No Degree 9%

FY 2011 Through Fiscal Month-Ended September 25, 2011 (Q4), excluding ECH
JPL Historical Mosaic

1936
1958

1940s
1950s

JPL today
JPL’s Mission for NASA is **Robotic** Space Exploration

- Mars
- Solar system
- Astrophysics
- Earth Science
- Interplanetary Network
- Problems of “National Significance”
JPL Has Launched 24 Spacecraft, 9 Instruments Across the Solar System (and Beyond)
Kepler’s Observing Transits of 100,000 Earth-sized Exoplanets
Non-NASA programs
National Space Technology Applications (NSTA)

**Defense**
Large, lightweight structures, electronics, optics, radar, GPS

**Intelligence**
Nano-laminate optics, Dual blaze -convex gratings, unique image processing

**Civil**
Advanced sensors for climate monitoring: altimeters, radiometers, scatterometers, radar

**Commercial**
APS, QWIP cameras, composite optical surfaces, lightweight electronics

JPL Proprietary, Confidential in Commercial
Present JPL Energy Technology Portfolio

- Batteries
- Solar Thermal
- Solar
- Thermal Conversion & Storage Systems
- Power Management & Distribution
- Fuel Cells
- Alternate Fuels
- Ad. Li Ion Battery
- H2 Storage
- Quantum Dot PV
- Nano Solar
- TE Waste Heat Recovery
- Active heated and cooled seating system
- Low Cost FC Catalyst
- Direct Methanol Fuel Cells
- Smart Grid
- Fe-Air Batteries
- LiIon Battery: CELl REACTION: $\text{Li}_{x} \text{C} + \text{Li}^{+} \rightarrow \text{LiCoO}_{2}$
- LC d spacing
- Layered Structure of LiCoO$_2$ $2x(1-x)$
- Ad. Li Ion Battery: Schematic Diagram of a Li-ion cell.
JPL Terrestrial Energy Technology Programs: 1970’s & 1980’s

- Flat Plate Solar Array Project
- SAGE Solar Panel Tests in 1974
- Solar Thermal System –ORC
- Solar Thermal Test Facility at AFB
- Wireless Power Transfer
- ETV-1
- Hydrogen Car
- Water Treatment Tested
- ETV-2
- EV Batteries
- Clean coal Technology
JPL Energy Technology Programs: 1990’s

Li-SOCl₂ Batteries

Ag-Zn Batteries

AMTEC

Regenerative PEM Fuel Cells

Direct Methanol Fuel Cells
JPL Energy Technology Programs: 2000’s

Solar Cells Activities
- UltraFlex
- Mars solar cells
- Dust Removal Systems

TE Activities
- TE Multi Couple
- ATEC Couple
- Adv. TE Couple

Battery Activities
- MER Batteries
- Li-Ion Battery Lunar Rovers

Aerogel insulation

Fuel Cell Activities
- Low Cost FC Catalyst

Hydrogen Storage

DMFC 300 W System

DMFC Battery Charger
The Beginnings of the FSA Project
A Comprehensive Approach from Sand to PV Systems

Low-Cost Silicon Solar Array Project 1975 Org Chart
JPL led federally funded activity directed at developing the engineering technology base required to achieve modules that meet the functional, safety and reliability requirements of large-scale terrestrial photovoltaic systems applications. These activities included:

- Development of functional, safety, and reliability requirements for such applications
- Development of the engineering analytical approaches, test techniques, and design solutions required to meet the requirements
- Synthesis and procurement of candidate designs for test and evaluation; and
- Performance of extensive testing, evaluation, and failure analysis to define design shortfalls and, thus, areas requiring additional research and development.
JPL has been very active in the development of advanced power systems for over 40 years, and brings strong capabilities to bear in this area.

Through the FSA Project, JPL made seminal contributions in PV Reliability studies in the 80s.

As a National Laboratory (FFRDC), JPL is well positioned to be an unbiased investigator and evaluator of sensitive scientific and engineering data. This function is in keeping with our charter to contribute solutions to “problems of national significance.”

We would like to contribute solutions to this community.