U.S.-- Recent Energy Technology Developments

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Lawrence Livermore National Lab

- Powerful new rechargeable battery
- Miniature thin-film fuel cell power source
- Provides portable electrical power for a range of consumer electronics
- With new system, typical cell phone battery could be projected to last more than 300 percent longer, extending standby time from four days to two weeks, and talk time from six hours to two days

National Energy Technology Laboratory

- Sonic wave energy resource recovery
- Sonic waves help recover natural gas from clogged storage sites
- Potential to increase significantly the efficiency at which natural gas is withdrawn from storage reservoirs

Oak Ridge National Lab

- Personal cooling systems
- Material currently being developed that boosts thermal conductivity five times greater than aluminum
- Envisioned the system would provide chilled air to circulate within the suit and helmet of a fighter pilot
- Has other potential applications

Ames Laboratory

- Magnetic refrigerators
- New system that cools by means of magnets, operates at room temperature, and can fit inside home appliances
- Exploits magnetically heating and cooling of a powder of the element gadolinium

National Renewable Energy Lab

- Solar cell capable of record-breaking efficiency
- Cell reaches 34 percent conversion efficiency under a concentration of 400 suns, the power of our sun concentrated by solar arrays
- Also, new, simple approach for recharging lead-acid batteries
- Extends the life cycle of the batteries by 300 to 400 percent by using a non-constant current and voltage application

Lawrence Berkeley Lab

- Hybrid solar cells combine nanotechnology with plastics
- New semiconductor-polymer photovoltaic device
- Such hybrid solar cells will be cheaper and easier to make than their semiconductor counterparts
- They can also be made in the same nearly infinite variety of shapes as pure polymers

Los Alamos National Lab

- Mars Odyssey's neutron spectrometer maps hydrogen that may indicate water-ice just below Mars's surface
- Locating water on Mars would support theories that the environment once supported, and possibly still does support, life
- The neutron spectrometer looks for neutrons generated when galactic cosmic rays slam into the nuclei of atoms on the planet's surface, ejecting neutrons skyward with enough energy to reach an orbiting spacecraft

Argonne National Laboratory

- World-class research facilities keep hi-tech companies on top of the market
- Abbott Laboratories uses Argonne's Advanced Photon Source to develop drugs in months instead of years by obtaining high-quality images of proteins that are potential drug sources
- BP is able to use Argonne's Intense Pulsed Neutron Source to make measurements one million times better than they can in their own laboratory

Brookhaven National Lab

- New advances in the study of high-temperature superconductivity
- Using techniques developed by the National Synchrotron Light Source excitations and interactions of electrons participating in superconductivity are studied carefully and may help reveal the exact mechanisms behind high-temperature superconductivity leading to improvements in efficiency

Conclusions

- What I have presented today is just a small sample of new technology developments at the Department of Energy's labs
- Many of these new developments are in the area of new energy technologies, but some are in the basic sciences arena
- This reflects the multi-mission nature of DOE, having responsibility for both basic sciences and new energy technology development