Unique Insights into Leading-Edge Cleantech Innovations

2014 Projects

10:00 Overcharge Protection for Lithium-Ion Batteries

Electric vehicle fires caused by thermal runaway due to battery overcharging can cost lives, slow EV adoption, and lead to class action lawsuits as well as reduced vehicle company stock prices. Researchers at LBL have developed a new type of separator that can improve lithium-ion battery safety. These separators help prevent runaway overcharge events. Potential applications include battery packs for EVs and other large, complex battery systems.

Scientist

Guoying Chen, Electrochemical Technologies Group, Lawrence Berkeley National Laboratory

C2M Student Team

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Louis Raynaud, MBA 2015
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10:30 Mathematics to Optimize the Smart Grid

With growing penetration of distributed renewables, electric vehicles, and demand response, the distribution grid promises to become as complex and crowded as the Internet. The same mathematicians at Caltech who helped optimize the web have developed similar algorithms to help manage the grid of the future. These solutions involve scalable, real-time decentralized algorithms for providing voltage regulation and reactive power at lower cost and with higher reliability.

Scientists

Steven Low, Computer Science & Electrical Engineering, Caltech
Paul De Martini, Resnick Sustainability Institute, Caltech
Desmond Cai, Electrical Engineering, Caltech
Qiuyu Peng, Electrical Engineering, Caltech

C2M Student Team

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11:00 Phage Biofilm for Sensing and Generating

Bioengineering can solve a host of problems from natural gas sensing to advanced medical devices. Berkeley researchers have developed a genetically engineered biomaterial that exhibits both sensing and piezoelectric properties. This inexpensive, environmentally friendly phage material leverages nature's ability to self-replicate and self-assemble and has a wide range of potential applications, including field sensing and biologically powered implants such as pacemakers.

Scientist

Seung-Wuk Lee, Bio-Nanomaterials Lab**,** Lawrence Berkeley National Laboratory

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Kelly Ling, MBA 2015
Alexander Shearer, PhD Chemistry 2015

11:30 DC Microgrids for Greater Efficiency

As developing nations electrify, the hope is that they will use more efficient systems to avoid excess carbon emissions and thereby help mitigate climate change. Researchers at UC Berkeley have developed a DC micro grid architecture that maximizes end-to-end efficiency for renewables-based systems. One of several goals is to promote a DC-based paradigm for the developing world.

Scientists

Achintya Madduri, Electrical Engineering, UC Berkeley
Seth Sanders, Electrical Engineering, UC Berkeley
Eric Brewer, Electrical Engineering, UC Berkeley

C2M Student Team

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Sherry Wu, MBA 2015

1:00 Soft Magnets for Improved Motors

Motors power society and are hidden in virtually every form of transportation and manufacturing. They also use a significant portion of the world's fuel. Researchers at Carnegie Mellon have developed new magnets that can make motors smaller, lighter, more efficient and/or more powerful, thereby driving superior performance and cost savings.

Scientists

Vincent DeGeorge, Materials Science & Engineering, Carnegie Mellon
Michael Mchenry, Materials Science & Engineering, Carnegie Mellon

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Danny Hellebusch, PhD Chemical Engineering 2015
Paul Hogan, MBA 2015
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David Liu, MBA 2015

1:30 Modular Roofing for Impoverished Areas

Existing slum roofs lead to uncomfortable and dangerous living conditions. ReMaterials, a startup based in India, is working with researchers at UC Berkeley on developing a low cost modular roofing solution for slum housing based on coated and compressed recycled materials. They fill a significant market gap by offering health and safety improvements over low cost options, but at a much lower price than the high-priced alternatives.

Scientists

Susan Amrose, Civil & Environmental Engineering, UC Berkeley
Hasit Ganatra, ReMaterials
Lisa von Rabenau, ReMaterials

C2M Student Team

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Caitlin Touchberry, MS Development Practice 2015
Daniel Wong, MBA 2015

2:00 Ultra-High Efficiency Concentrating Photovoltaics (PV)

As PV challenges the grid with its narrow generation profile and low module efficiencies, researchers at Caltech are working on a concentrating solar PV design that is dramatically more efficient than the vast majority of the current market. They seek to generate 1.5-2X more energy on an annual basis over existing technologies. This has the potential to offer a more attractive profile for grid integration in a cost-effective way, particularly where electric prices are high and land is scarce.

Scientists

Harry Atwater, Applied Physics & Materials Science, Caltech
John Lloyd, Materials Science, Caltech
Sunita Darbe, Materials Science, Caltech
Cristofer Flowers, Chemistry, Caltech

C2M Student Team

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Dan Bu, PhD Engineering & Operations, 2015
David Garfield, PhD Chemistry, 2017
Serve Ouedraogo, MBA 2015
Kurt Sheline, MBA 2015

2:30 NearZero Flywheel Battery

While many flywheels optimize their designs for power, researchers at UC Berkeley have developed a new flywheel design that seeks to provide high-energy storage in a smaller footprint that can be optimized for both power and energy. Their prototype achieves higher levels of performance by incorporating advanced electronics and control strategies to minimize losses. It also operates well under extreme weather conditions, making it ideal for remote operations.

Scientists

David Olmos, UC Berkeley & United Technologies
Sadegh Asefi, Near Zero
Drew Sabelhaus, UC Berkeley & NASA Ames

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