Clean Green IGERT Newsletter

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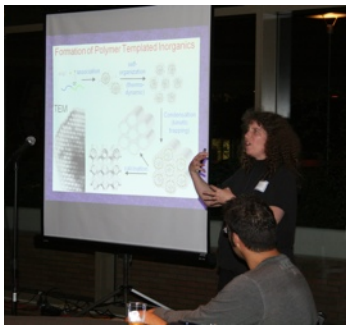
Highlights from the first year of the Clean Energy for Green Industry Traineeship for Graduate Studies at UCLA

Open House

CGI hosted our first "Open House" on November 5, 2009 to attract local undergraduate seniors who are seeking to earn a PhD in clean energy related fields. Speakers included several CGI faculty and trainees, as well affiliates Rick Ainsworth (Center for Engineering Excellence and Diversity), Prof. Charles Corbett (Leaders in Sustainability program, Anderson School of Management), Dr. Paul Bunje (Center for Climate Change Solutions, Institute of the Environment), and Michael Swords (Clean Tech LA).



Prof. Sarah Tolbert

Sustainability Networking Night

With the goal of uniting campus student groups, CGI trainees held the "Sustainability Networking Night" workshop on May 19, 2010. The well received workshop was attended by members of Sustainable Urban Network, E3, Forum for Energy Economics and Development, Engineers Without Borders, Sustainable Resource Center, Engineering Graduate Student Association, Net Impact, and the Institute of the Environment. Each student group gave a presentation and there was a session to discuss ways in which the groups could improve and strengthen their purpose and overall collectivity. Members of EGSA won the sustainable bingo game and received a remote control solar car as their prize.

CNSI High School Nanoscience Program

Trainee Mark Lewis

Throughout the year, CGI trainees volunteered with the CNSI High School Nanoscience Program to instruct high school teachers in the Los Angeles Unified School District by conducting experiments so that they may bring nanoscience to their classrooms. The eight experiments give students hands-on experience with materials, methods, and devices, including self-assembly, magnetic fluids, chemical sensors, solar cells, photolithography, superhydrophobic surfaces (or the lotus effect), water filtration, and the toxicity of nanoscale systems compared to similar materials in bulk form.

Governors' Global Climate Summit

Governors, regional leaders and agency executives from the United States, China, India, Brazil, Mexico, Canada, the EU and other nations met at the second Governors' Global Climate Summit in October 2009, in advance of UN Climate Change Conference in Copenhagen held in December 2009. The Summit was attended by 3 CGI trainees, Rita Blaik, Nichoclas Nairn-Birch, and Joshua Shapiro, who had the opportunity to meet with former California Governor Gray Davis.

Trainee Joshua Shapiro and former California Governor Gray Davis

IGERT Project Meeting

Rita Blaik represented CGI at the NSF-IGERT's annual Project Meeting held in May 2010 in Washington, DC. Rita's poster presentation of her work on "Three-Dimensional Biofuel Cells" was one among 126 research posters from IGERT programs across the country.

Other Conferences

Nicholas Nairn-Birch attended the Navigating the American Carbon World conference and trade fair held in April 2010 in San Francisco. NACW addressed post-Copenhagen policies and regulations, carbon markets and social equity, as well as strategies and solutions.

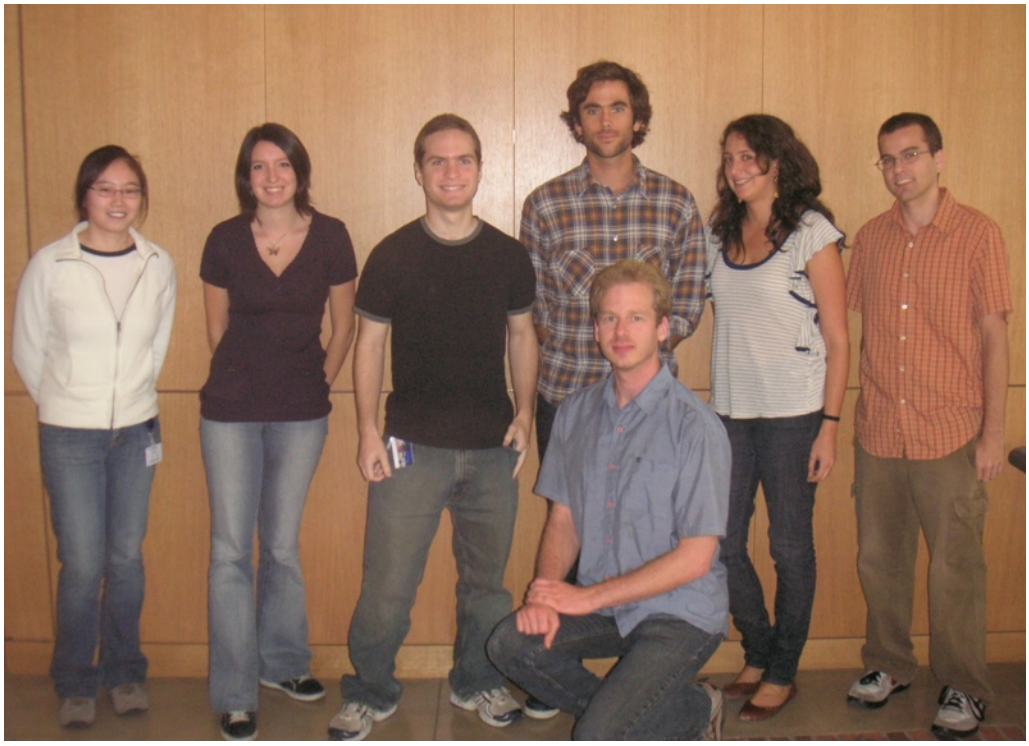
Collaboration Project Award

Two collaboritve projects between CGI trainees were awarded funding: Rita Blaik and Benjamin Feinberg (new trainee for Fall 2010) for their project on "Fabrication and Evaluation of a Prototype Microbial Desalination Cell"; Joshua Shapiro and Jessica Wang for their project on "Interface Physics at Hybrid Organic-Inorganic Semiconductor Junctions".

Green Certification Project

CGI is currently collaborating with the City of Los Angeles, the Los Angeles Community College District, and the Los Angeles Department of Water and Power to develop a green business certification program. CGI will develop the energy efficiency criteria for certification and carry out quantitative analysis of the extent to which the certification process can reduce greenhouse gas emissions in Los Angeles.

(clockwise from left): Jessica Wang, Amy Ferreira, Brion Bob, Nicholas Nairn-Birch, Rita Blaik, Mark Lewis, Joshua Shapiro



Clean Green IGERT Trainees 2009-2010

Seven graduate students were selected in Fall 2009 for the inaugural year of the Clean Green IGERT.

Rita Blaik (Materials Science & Engineering Dept, advisor Prof. Bruce Dunn) studies enzymatic biofuel cell architectures. CGI role: External Relations. Community project: Clean Tech LA, Los Angeles Business Council.

Brion Bob (Materials Science & Engineering Dept, advisor Prof. Yang Yang) conducts research on the copper indium gallium selenium (CIGS) quaternary system and its incorporation into photovoltaic devices. CGI role: Campus Relations/Event Coordinator. Community project: Campus Sustainability.

Amy Ferreira (Chemistry & Biochemistry Dept, advisor Prof. Sarah Tolbert) seeks to construct low cost solar cells from an amphiphilic assembly of semiconducting polymers. CGI role: Outreach Coordinator. Community project: Tree People.

Mark Lewis (Electrical Engineering Dept, advisor Prof. Kang Wang) fabricates magnetic tunnel junctions (MTJs) to integrate energy efficient STT-RAM with CMOS circuits. CGI role: Media Relations/Documentation. Community project: Clean Tech LA.

Nicholas Nairn-Birch (Environmental Science and Engineering Dept, advisor Prof. Magali Delmas) measures the relationships between business strategy, energy dependency, and emissions of greenhouse gases. CGI role: External Relations. Community project: Los Angeles Community College District Green Certification Project.

Joshua Shapiro (Electrical Engineer Dept, advisor Prof. Diana Huffaker) fabricates high quality 3-D nanoscale heterostructures for high efficiency photovoltaics and optoelectronic devices. CGI role: President. Community project: Clean Tech LA.

Jessica Wang (Chemistry & Biochemistry Dept, advisor Prof. Richard Kaner) investigates the synthesis of extra-long polyaniline nanofibers for photovoltaic devices. CGI role: Campus Relations/ Event Coordinators. Community project: Campus Sustainability, Sustainable Works.

Research Highlights

Prof. Magali Delmas and trainee Nicholas Nairn-Birch co-authored an article that advances knowledge in social science through interdisciplinary research. The article, "Is the Tail Wagging the Dog? An Empirical Analysis of Corporate Carbon Footprints and Financial Performance", investigated the impact of greenhouse gas emissions (GHG) on corporate financial performance, including both direct and supply chain GHG emissions. The analysis is based on a novel longitudinal database including over 1100 US firms across a range of industries for the 2004-2008 period. The results reveal that increasing carbon emissions positively impact financial performance when using accounting based measures while it has a negative impact on market based measures of financial performance.

CGI facilitated collaboration between Prof. Bruce Dunn's laboratory and that of Prof. Eric Hoek, who will advise a trainee starting Fall 2010, on biological fuel cells, has allowed trainee Rita Blaik to consider multiple facets of research, including life cycle analysis and sustainability. The greatest interdisciplinary challenge lies in keeping the enzymes in the biofuel cell both attached and alive, while also preparing a thin enough electrode to measure an oxidation current. Rita has been searching for new ways both to make the samples thinner and perhaps attach various chemical binders to the electrodes. However, binders may present a problem if they are not bio-compatible with the enzymes.

Nicholas Nairn-Birch and Rita Blaik debate sustainable solutions

Partnership

Prof. Yang research lab and EMD Chemical, associate of Merck KGaA, have conducted an extensive analysis via Raman spectroscopy of the super-molecular structure of various chalcogenide compounds dissolved in hydrazine. A number of bonding structures have been identified and trainee Brion Bob is working to develop a complete dissolution mechanism that will allow better preparation of chalcogenide based precursor solutions for the inexpensive and high-throughput processing of Cu(In,Ga)Se2 photovoltaic devices. Additionally, a better understanding of the dissolution mechanics required to drive these precursors into solution will provide a valuable advantage in the search for new solvents that can enhance the performance and processability of future devices.

New Members

In Fall 2010, we will welcome 11 new trainees as well as advisors Prof. James Liao (Chemical & Biomolecular Engineering), Prof. Eric Hoek (Civil & Environmental Engineering), Prof. C.J. Kim (Mechanical & Aerospace Engineering).

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NSF Award #0903720