

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Lab-Embedded Entrepreneurship Programs

*U.S. Department of Energy
Washington, DC*

Peter W. Winter, Ph.D.

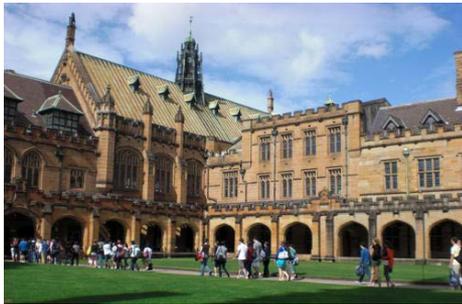
AAAS S&T Policy Fellow
Advanced Manufacturing Office
www.manufacturing.energy.gov

Topics

- 1. The problem we're after**
- 2. The Lab-Embedded Entrepreneurship Programs
(at LBNL, ANL, ORNL)**
- 3. How the programs work**
- 4. Impact so far**
- 5. Keys to success**

Creating a home for science-based innovators

Where can innovators go to develop disruptive new hardware-based technology?



Academic R&D

INTEREST:

New ideas,
fundamental R&D;
focus on publications



Corporate R&D

INTEREST:

Incremental
technologies core to
business model



Tech Startup

INTEREST:

Later stage; good for
capital-light technologies

Spin the nation's top innovators "in" to the National Labs

The Lab-Embedded Entrepreneurship Program model



① **Recruit** the best energy technology innovators

② **Leverage** expert mentorship and world-class facilities at the national lab on a win-win basis

③ **Position** people and technology for market

The Lab-Embedded Entrepreneurship Programs

1. Cyclotron Road @ Lawrence Berkeley

- Launched mid-2014
- Partnership with Activation Energy
- Cohort 4 onboarding in progress

cyclotronroad



2. Chain Reaction Innovations @ Argonne

- Launched mid-2016
- Partnership with Polsky/Purdue
- Cohort 2 onboarding in progress



3. Innovation Crossroads @ Oak Ridge

- Launched mid-2016
- Partnership with LaunchTN
- Cohort 2 onboarding in progress



How the Programs work

Innovator financial support:

Oak Ridge Associated Universities (ORAU) administers ORISE fellowships for two years (funded by AMO).

National lab program support:

Full program administration provided by National Labs (funded by AMO)

Early-stage R&D support:

AMO-funded support to National Lab to seed innovator's R&D projects; Labs may supplement funding.

The President's Budget requested \$7.5M for the Programs in FY 2018.

- Planned support for each Program in FY 2018 is \$2.5M

Early successes from the Programs

- **Follow-on Funding:** Cyclotron Road Cohort 1 (6 projects) catalyzed over \$15 million of foundational research funding and initial private investments, including over \$5 million in private funding from sources including philanthropy, angel investors, venture capital, and strategic investors. All Cohort 1 teams graduated from Cyclotron Road with 12-18 months of follow-on runway.
- **Job Creation:** 30 high tech manufacturing innovation jobs already supported by new companies founded by Cyclotron Road's Cohort 1 innovators.
- **National Recognition:** Since 2016, a total of 7 innovators from the Programs have been named to Forbes' prestigious "30 under 30" list in the energy category, including 4 innovators in this year's list.
- **New Opportunities:** To date, the Programs have provided 39 top-tier innovators with a previously non-existent entrepreneurial platform from which to advance breakthrough energy technologies toward commercial impact.
- **Efficient Use of Funding/Avoided Costs:** Interviews suggest ~\$1M and 6-12 months of development cost/time can be avoided through participation in the Programs.
- **Federal Partnerships:** The DoD through DARPA is piloting support for 3 innovators at Cyclotron Road in 2018.

Leveraging National Lab capabilities and expertise

Argonne National Lab

- Center for Nanoscale Materials
- Advanced Photon Source
- Materials Engineering Research Facility

Oak Ridge National Lab

- Spallation Neutron Source
- Manufacturing Demonstration Facility
- Center for Nanophase Materials Sciences

Lawrence Berkeley National Lab

- The Molecular Foundry
 - Advanced Light Source
 - National Energy Research Scientific Computing Center
-

Lab Scientists on Benefits:

- Lets me diversify knowledge, network, and research portfolio
- Get to work with “all-in” innovators & drive real-world impact
- Innovators are enhancing my equipment and capabilities
- learning about industry needs from a different perspective
- I may have an opportunity to be part of a startup
- Helps bring outside funding into the lab

Keys to Program success

1. Focus on the innovators, and on providing a pathway for top scientists and engineers to become energy and manufacturing entrepreneurs outside conventional financing pathways.
2. Focus on hardware-based technologies at a nascent stage that can significantly impact the energy sector. These technologies typically require high capital intensity and long development cycles.
3. Integrate the innovators into a world-leading technical environment coupled to a broader ecosystem to support entrepreneurial training and venture development.
4. Leverage the host institution infrastructure and technical expertise to serve entrepreneurs.
5. A commitment toward bottom-up execution with senior Lab leadership support.
6. Utilize entrepreneurship resources in the regional innovation ecosystem (e.g. Cyclotron Road proximity to the Silicon Valley entrepreneurship community).
7. Secure a high-intensity and top-notch execution team that is fully committed to the Lab-Embedded Entrepreneurship Programs.

Thank You

Cyclotron Road (alumni)

Cohort I

(2015-2017)

OPUS 12 electrochemical CO₂ to fuel

CALWAVE next generation wave power

POLYSPECTRA photo-activated polymers for 3-d printing

SPARK thermionic heat engine on a chip

MOSAIC materials for industrial gas separations

VISOLIS bio-based production of carbon-negative, high-performance polymers



Kendra Kuhl
OPUS 12



Etosha Cave
OPUS 12



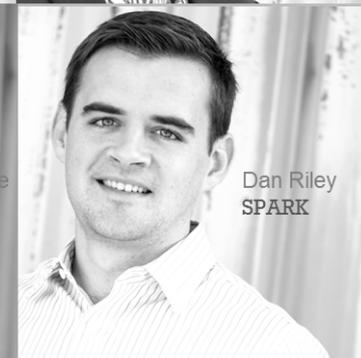
Marcus Lehmann
CALWAVE



Ray Weitekamp
POLYSPECTRA



Jared Schwede
SPARK



Dan Riley
SPARK



Tom McDonald
MOSAIC



Deepak Dugar
VISOLIS

Cyclotron Road (alumni)

Cohort II

(2016-2018)

MALLINDA fully re-shapeable and recyclable polymers

IRIS PV ultra-high efficiency perovskite tandem solar cells

SYNVITROBIO cell-free platform for rapid bio-discovery

FEASIBLE diagnostic imaging for safer and cheaper batteries

SEPION nanoporous polymer separators for high energy batteries

CUBERG materials for ultra-low cost, high energy density batteries

