

# Idaho Incubation Fund Program

## Progress Report Form

**Proposal No.** IGEM16-02  
**Name:** Kurtis Cantley  
**Name of Institution:** Boise State University  
**Project Title:** Enhancing Capabilities in Microfabrication at Boise State  
**Reporting Period:** February 1, 2016 to June 29, 2016

**Information to be reported in your progress report is as follows (attach additional information as needed):**

1. Summary of project accomplishments for the period just completed and plans for the coming reporting period:

Since the last report submitted at the end of January 2016, we have continued work on facility infrastructure upgrades and installation of new equipment. Both the technical support engineer and new ECE faculty member were also successfully hired from the respective applicant pools. A list of specific project objectives and related outcomes during this period is given below.

- In place of the ion mill end point detector (which was declared infeasible for the time-being), purchase of the Fuji Dimatix materials inkjet printer originally scheduled for year 3 was moved forward. This decision was made primarily in response to interest in the tool both from Boise State faculty as well as several local companies and researchers at Idaho National Lab. The tool arrived in May, has been set up, and is currently being used by summer student in the Research Experience for Undergraduates (REU) Materials for Energy and Sustainability program.
- Installation of the ultra-pure nitrogen distribution system inside the clean room (ENGR 105 and 107) has been completed. This system runs pump bleeds, sample drying sprayers, and chamber purges throughout the facility and is sourced from the 1000 L bulk liquid N<sub>2</sub> tank located outside the building. It has resulted in significant savings compared to keeping multiple compressed gas tanks inside the facility.
- The hiring process for the new technical support engineer is complete. Travis Gabel has approximately 12 years of experience as a field service technician in the semiconductor industry with international suppliers. He has already been actively involved with training users, running processes, and troubleshooting equipment and is an excellent addition to the College of Engineering staff.
- Completion of the hiring process for the new ECE faculty member, Dr. Harish Subbaraman. Dr. Subbaraman is currently a senior research scientist at Omega Optics in Austin, TX, and graduated from the University of Texas at Austin in 2009. He has received over \$5 million in external funding at Omega Optics, primarily in the form of Small Business Innovation Research (SBIR)

and Small Business Technology Transfer (STTR) grants. We fully anticipate that in addition to his technical expertise, Dr. Subbaraman's experience in writing successful proposals will be useful to local small businesses.

- Delivery and final installation of three wet chemical processing stations (acid, base, and solvent) from Boise-based JST Manufacturing, Inc. The initial proposal called for purchase of only two benches, but the company was able to offer a significant discount as well as an upgrade to a slightly used bench, resulting in the same total cost. Together, these three pieces of equipment are already finding heavy use with faculty researchers, students, and industrial partners and collaborators.

2. Summary of budget expenditures for the period just completed (include project burn rate):

As of June 20<sup>th</sup> 2016, 100% of the \$500,000 year 1 budget has been encumbered or spent. Since initial funds were received in September 2015, this corresponds to a **burn rate of approximately \$56,000/month** over the 9 months. Major purchases and expenditures include:

- \$47,500 for the Fuji Dimatix DMP-2831 Materials Printer
- \$52,000 for the Bruker Dektak XT-A stylus profilometer
- \$192,000 for the three new wet chemical processing stations from JST Manufacturing, Inc.
- \$16,000 for the Zeiss materials inspection microscope
- Approximately \$70,000 in total for supplies, and facility and equipment upgrades and installation
- Approximately \$126,000 in salary and associated fringe for IML staff (director and new technical support engineer).

The only items on the list which are encumbered (set to be paid in the next 1-2 weeks) are the optical inspection microscope and some facilities contractor invoices.

3. Numbers of faculty and student participation resulting from the funding, including internships:

Currently, there are no students or faculty supported directly by this project, but the new ECE faculty and graduate students will be supported beginning in August 2016. Funds provided through the grant include \$100,000 in research start-up needs, full faculty salary and fringe benefits, as well as the stipend and associated fees for the graduate research assistants.

4. List patents, copyrights, plant variety protection certificates received or pending:

None at the current time.

5. List technology licenses signed and start-up businesses created:

At this time there are no start-up businesses created as a result of the funding. However, memristor (resistive memory) technology developed by Prof. Kris Campbell in the ECE department has been licensed by Knowm, Inc. and M. Alexander Nugent Consulting (MANC) of Santa Fe, NM. If their projects proceed as expected, as much as \$100,000 could be spent in the IML over the next 1-3 years.

6. Status of private/industry partnerships (include enough information to judge level of engagement):

Several new agreements with Idaho businesses have been put in place since the start of the project to use the IML and new equipment and processes contained in it. These include:

- American Semiconductor, Inc. (Boise, ID) has heavily used the new Bruker stylus profilometer and presented results at multiple conferences and workshops with credit to the IML at Boise State. They are also working to expand contract usage with lithography and chemical processing.
- Fiberguide, Inc. (Caldwell, ID) was previously using the old wet bench for process development and anticipates heavy use of the new benches in the coming months.
- Collaborative use of the Bruker stylus profilometer for a joint project with Idaho National Laboratory (INL), with additional use planned for the future.
- A new non-disclosure agreement (NDA) has been put in place between Boise State and PakSense, Inc. to initiate and protect collaborative research, particularly with the new ECE faculty member. This has already resulted in a proposal submitted to the NextFlex Project Call 2.0.

7. Any other pertinent information that will indicate to the council that the project is meeting satisfactory progress.