Industrial Membership Program and Innovation Model

John J Mitchell
Industry Liaison Officer
Arizona State University
Help address the Terawatt Challenge

Reducing costs
Improving efficiency

1.5 Billion people in the dark (21%)
Industry engagement strategy

Vertical integration

Pure solar company

Market makers

Targeted innovators

Improved efficiencies

Degree of diversification

Conglomerate

Materials, equipment

Market catalysts

Economies of scale

Reduced cost
Industry engagement

Level of engagement, rights

Investment

- Solar Power Labs
- QESST Membership
- Non exclusive IP rights
- Associated Projects
- Exclusivity

- No IP implications
Industry engagement

- QESST Membership
- Associated Projects
- Solar Power Labs
Year 5 associated industry projects

Vertical integration

Degree of diversification

SolarWorld

Agril

Crystal Solar

Applied Materials

ENI Spa

Technic
Year 5 grant partners

- REC
- Creative Light
- Navillum
- Photonitride
- 510 Nano
- CFD Research
- First Photonics

Vertical integration

Degree of diversification
Other affiliated companies

- First Solar
- Azur Space
- Qualcomm
- Space Micro
- TI
- PV Lighthouse
- Sentaurus
- Gift
- License

Vertical integration

Degree of diversification
Year 5 QESST Industry Members

Vertical integration

First Solar
Soitec
Yingli
Hanwha USA

Degree of diversification

Sinton Instruments
ASE Inc.
CFD Research

Applied Materials
Veeco
Technic
National Instruments
Year 5 industry partners combined (35)

- REC
- First Solar
- SolarWorld
- Soitec
- Azure Space
- Yingli
- Hanwha USA
- Qualcomm
- Sunpreme
- Space Micro
- Navillum
- Sinton Instruments
- Crystal Solar
- Mossey Creek
- Creative Light
- ASE Inc.
- Nth Degree
- Photonitride
- 510 Nano
- Sentaurus
- Nanomotif
- First Photonics
- Agril
- PV Lighthouse
- CFD Research
- Reger
- Powerfilm
- Natcore
- Applied Materials
- Veeco
- ENI Spa
- TI
- Technic
- National Instruments
- L3 Comm.
Membership trends

- First Solar
- Sinton Inst.
- Technic Inc
- Applied Mtl
- Vecco
- CFDR
- NI
- Yingli
- ASE Inc
- Soitec
- PV Spec.
- Hanwha
- Accustrata
- AND
- PV Recycling
- Amtech
QESST Industry Members

Characterized by

- strategic alignment with QESST
- longer term commitments
- multi-faceted
Member engagement

Sustainability and CdTe projects

Four year commitment

Co-author papers

Donated 1000 modules
Series 4™ PV Modules

Solar Energy Engineering & Commercialization

Advisory Board member

20+ alumni from the program
Member engagement

Chair the IAB

Partnered on DoE grant

low cost silicon

Multiple internships and hires

Customer to a QESST spinout

Multi-year commitment in process

Tim Reblitz
QESST Scholar
Member engagement

Partnered on DoE grant

High Efficiency Low Cost Tandem Solar Cells

Multiple internships

Research across facilities (ASU and Veeco)

Co-author on papers

Chaomin Zhang
QESST Scholar

Yeongho Kim
QESST Scholar
Member engagement

First IAB Member

Multi-year commitment

Multiple donations of equipment

Academic collaboration on 5 projects

Mentoring QESST Scholars

Silicon workshop

Lab access to QESST Scholars

Simone Bernardini
QESST Scholar

Mallory Jensen
MIT QESST Scholar

Ashley Morishige
MIT QESST Scholar
Member engagement

Three year commitment

Associated projects

Partner on DoE grant

Silver free metallization

Plating tools installed in QESST labs

Joe Karas
QESST Scholar
Member engagement

Certification training for over ~60 students

NI technology embedded in the Holman Lab

International development projects – HEEAP

Trained over 250 faculty from 8 universities
Member engagement

AddVenture Support Enterprises, Inc.
• Business & Technology development
• Angel investors

Sponsored research at Georgia Tech

Student and project mentoring

Soo Chin
Principal, ASE

Chloe Fabian
GT QESST Scholar
Member engagement

SBIR/STTRs

NASA solar cells for space arrays

DTRA distributed radiation sensors – Phase II

Joint proposal with University of Houston

Student mentoring with Mallory Jensen (MIT)
Member engagement

QESST supporting CFDRC’s incubator

Based on I-Corps Program

Learnings from Perfect Pitch

Co-locating at the ASU SkySong campus
Funding model – SECO wins

- Quarterly grant writing workshops
- Joint SBIR/STTR proposals
- SECO proposals
- SunShot proposals
- Spin-out companies

ARGIL, INC.
Where are they now

Eva Pettinato
Aerospace Engineer at Orbital ATK
Phoenix, Arizona Area | Aviation & Aerospace
Current: Orbital ATK, Self-Employed
Previous: Arizona State University, Arizona Science Center Expo
Education: Arizona State University – Ira A. Fulton Schools

Guy Pickett
Process Engineer at Alta Devices
San Francisco Bay Area | Higher Education
Current: MISO
Previous: Arizona State University, Applied Materials, United States Marine Corps
Education: Arizona State University

Carrie Culp
Engineer II Expansion Planning at MISO
Greater New Orleans Area | Utilities
Current: MISO
Previous: Arizona State University, GEESST, Midwest ISO
Education: Arizona State University

Priyaranga Koswatta
Research Assistant
Tempe, Arizona | Semiconductors
Current: Arizona State University
Previous: Applied Materials, Sri Lanka Institute of Information Technology, Purdue University
Education: Arizona State University

Akhil Mehrotra
Process Engineer at Applied Materials
Sunnyvale, California | Semiconductors
Current: University of Houston
Previous: University of Houston
Education: University of Houston

Im Rebitz
Application Engineer at Applied Materials
Tampa, Florida | Semiconductors
Current: Applied Materials, Texas Biomedical Engineering
Previous: Arizona State University, Applied Materials, Direct Alliance
Education: Arizona State University

Chloe Fabien
Nanomaterials and Vacuum Engineering, Greater Seattle Area | Manufacturing
Current: Georgia Institute of Technology
Previous: Georgia Institute of Technology
Education: Georgia Institute of Technology

Juan Manuel Rueda
Research Scientist at Luminit
Tucson, Arizona Area | Research
Current: The University of Arizona, Primesense
Previous: The University of Arizona, Primesense
Education: The University of Arizona

Nicole Kotulak
NRC Postdoctoral Associate at Naval Research Laboratory
Washington, D.C | Government
Current: University of Delaware
Previous: University of Delaware
Education: University of Delaware

Vivek Sharma
PTD Thin Film Module Engineer at Intel Corporation
Hillsboro, Oregon | Semiconductors
Current: SunPower, SunPower, Tempe, Arizona | Solar Energy
Previous: SunPower, Tempe, Arizona | Solar Energy
Education: University of Delaware

Matthew Erdman
Graduate Technical Intern at Sandia National Laboratories
Rio Rancho, New Mexico | Semiconductors
Current: Sandia National Laboratories
Previous: Arizona State University, 310 Solar LLC
Education: The University of New Mexico

Sergio Castellanos
Energy Fellow at Berkeley Energy & Climate and ITESM
San Francisco Bay Area | Renewable & Environment
Current: Berkeley Energy & Climate Institute - ITESM
Previous: Massachusetts Institute of Technology (MIT), St. Energa (CENAM - Mexico), Secretariat of Energy, Architectures & Engineers, Inc
Education: Massachusetts Institute of Technology

Junli Li
DER Consultant at ICF International
Washington, D.C. | Oil & Gas
Current: ICF International
Previous: Environment Defense Fund, Center for Energy and Environmental Policy, University of Delaware, Foundation for Renewable Energy and Environment
Education: University of Delaware

Stephanie Scott
Mechanical Design Engineer at Apple
San Francisco Bay Area | Mechanical or Industrial Engineering
Current: Apple
Previous: MIT, PARC, CARES Project (Community Assessment, Renewable Energy & Sustainability)
Education: MIT

Prateek Garg
Electrical Engineer specializing in Solid State Devices
Hillsboro, Oregon | Electrical/Electronic Manufacturing
Current: Intel Corporation
Previous: Arizona State University, Qualcomm, Jawaharlal Nehru Centre for Advanced Scientific Research
Education: Arizona State University

Ben Wender
STAR Fellow at US EPA
Tempe, Arizona | Higher Education
Current: US EPA
Previous: University of Arizona - Mellon Fellowship
Education: Arizona State University

Hal Emmer
Senior Process Engineer at Maxim Integrated
Greater Los Angeles Area | Electrical/Electronic Manufacturing
Current: Maxim Integrated
Previous: California Institute of Technology
Education: California Institute of Technology

Shelby Vorndran
Intern at Edmund Optics
Tucson, Arizona Area | Renewables & Environment
Current: Photon Engineering, LLC, University of Arizona, College of Optical Sciences
Previous: Edmund Optics, University of California, Los Angeles, DePaul University
Education: University of Arizona
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Innovation resources

- Edson Funding
- Startup School
- eSeed Challenge
- Fulton Entrepreneurial Professors Program

Training → Funding → Experiential → Mentors

epics@asu.edu
Student Leadership Council driven

Salary negotiations workshop
Mock interviews
Budget writing workshop
Recent results

Priyaranga Koswatta
QESST Scholar

“John provided me with very valuable strategic guidance in terms of long range career planning, tactical job search techniques, interviewing practice, salary negotiations and general moral support. I am very thankful to him for lending his experience and guidance to me.”

April 17, 2016
Startups

Regher LLC - postdoc

Proximo Solar - postdoc

First Photonics – UNM faculty

TreeBlitz Engineering – PhD candidate

Innovative Advanced Materials Inc. – GT faculty

Innovative Advanced Technologies LLC – GT faculty
QESST Perfect Pitch Winner

1st place
Pablo Guimera Coll - ASU

2nd place
Jimmy Hack - UDEL

3rd place
Cristofer Flowers, CalTech

Selected by QESST Industry Advisory Board

Less than 1 point between 1st and 3rd place
National Perfect Pitch Winner

Competition amongst 19 ERCs across the country
Perfect Pitch Winner to Rock star

Radio interview

Headline news

Letter from the mayor

Buenos Dias Canarias
Este orotavense de 28 años ganó un importante concurso científico en Estados Unidos con una investigación sobre energía solar que permitirá reducir los gastos de producción de los paneles en el 30%.

El Gobierno de Somalia, en el colmo de la intransigencia, ha prohibido la Navidad en el país por creer que "esta festividad es contraria a la cultura islámica y podría dañar la fe de la comunidad musulmana."
Thank you

For the Impact
Backup slides
Value Proposition - Industry

- Access faculty, student, industry peers, know-how
- Access to lab resources
- Investigate gaps in technology roadmaps
Value Proposition - Industry

Workforce development

- Longest interviewing process in the country
- Training future scientists
Value Proposition - Industry

Workforce development

- The cost for one bad hire $140,000 – Bad hire calculator
  ADP
Value Proposition - Industry

- Financial leverage
  - NSF, DoE core funding
  - Reduced F&A rates
Value Proposition - Industry

Use QESST research to position your company for other opportunities

Access to the ASU library with thousands of journals and publications
Value Proposition - Industry

One straightforward agreement provides IP rights to all QESST universities
Industrial Membership Structure

PhD and postdoc access

Graduate student access

Non-exclusive, royalty free commercial IP rights

Non-exclusive royalty free IP rights for research purposes

Training workshops, semi-monthly webinars

Access to faculty, students, university lab resources

Access to pre-publications, presentations, annual report

Affiliate  General  Partner

Resources
Startups

Regher LLC
Stanislav Gerasimenko – “Stas”
1 patent issued and one pending
2 SunShot Incubator proposal,

Proximo Solar LLC
James LeBeau
High-powered laser processing technique (laser wafering) to reduce kerf loss
Patent pending
Startups

First Photonics
Ganesh Balakrishnan
Funding from
Cottonwood venture funds
UNM gap fund
Collaborating with NREL.

Reblitz Engineering
Software startup
Silicon Solar Device Fabrication & Characterization
Business Process Engineering

Collaborating with NREL.
Startups

Innovative Advanced Materials Inc.

Innovative Advanced Technologies LLC
Marketing QESST

- Faculty and students presenting at conferences
- ILO attending conferences
- Linkedin
- Google alerts
- Direct marketing
Communication with Industry Members

- Semi-monthly webinars
- Semi-annual advisory board meetings
- Workshops
- Annual report
- Annual review
- Newsletter
- One-one direct communications (customized)
Industry Calendar

### Activities

- **Industry Advisory Board Meeting**
  - J  
  - M  
  - J  

- **Annual site visit**
  - J  

- **1-1 meetings with individual members**
  - Throughout the year

- **IAB ranks faculty project proposals**
  - J  

- **Mentor project review**
  - J  

- **Vidyo series 1st and 3rd Monday of each month**
  - J  
  - F  
  - M  
  - A  
  - M  

- **PVSC Conference – student, industry luncheon**
  - J