



# Standards Development Organization (SDO) Forum

Andrew C. Rudack

Operations Manager – c-Si Programs

The data contained in all slides of this presentation is protected data produced under agreement no. DE-EE0004947 with the U.S. Department of Energy and may not be published, disseminated, or disclosed to others outside the Government until five (5) years from the date the data was produced, unless express written authorization is obtained from the recipient. Upon expiration of the period of protection set forth in this Notice, the Government shall have unlimited rights in this data. This Notice shall be marked on any reproduction of this data, in whole or in part.

# DOE SunShot Initiative

## Photovoltaic Manufacturing Initiative (PVMI)

- **PV Cells / Modules – 3 recipients**
- Balance of System
- Power Electronics

April 2011 – award recipients of PV cell/module

- Industry-led consortium, SEMATECH – PVMC
  - Lightweight PV (CNSE in Albany, NY)
  - **c-Si metrology and feedstock/wafering technologies (UCF/FSEC, Orlando, FL)**
- PV manufacturing development facility – Solar Rochester
- University-led consortium – BAPVC (Stanford/Berkeley)

### U.S. Photovoltaic Manufacturing Consortium (PVMC)



PVMC, Inc. Confidential



LPV



c-Si



# Staff

## c-Si PVMC Personnel

Winston V. Schoenfeld	<i>Director, c-Si PVMC</i>
Hubert Seigneur	<i>Program Manager, Feedstock/Wafering</i>
Kris Davis	<i>Program Manager, Metrology</i>
Joseph Walters	<i>Project Manager</i>
Paul Brooker	<i>Staff Scientist - Florida Solar Energy Center</i>
Andrew C. Rudack	<i>Operations Manager</i>

# c-Si U.S. PVMC Membership

Eleven members to date:

## Cell/Module



## Metrology



Ultrasonic Technologies

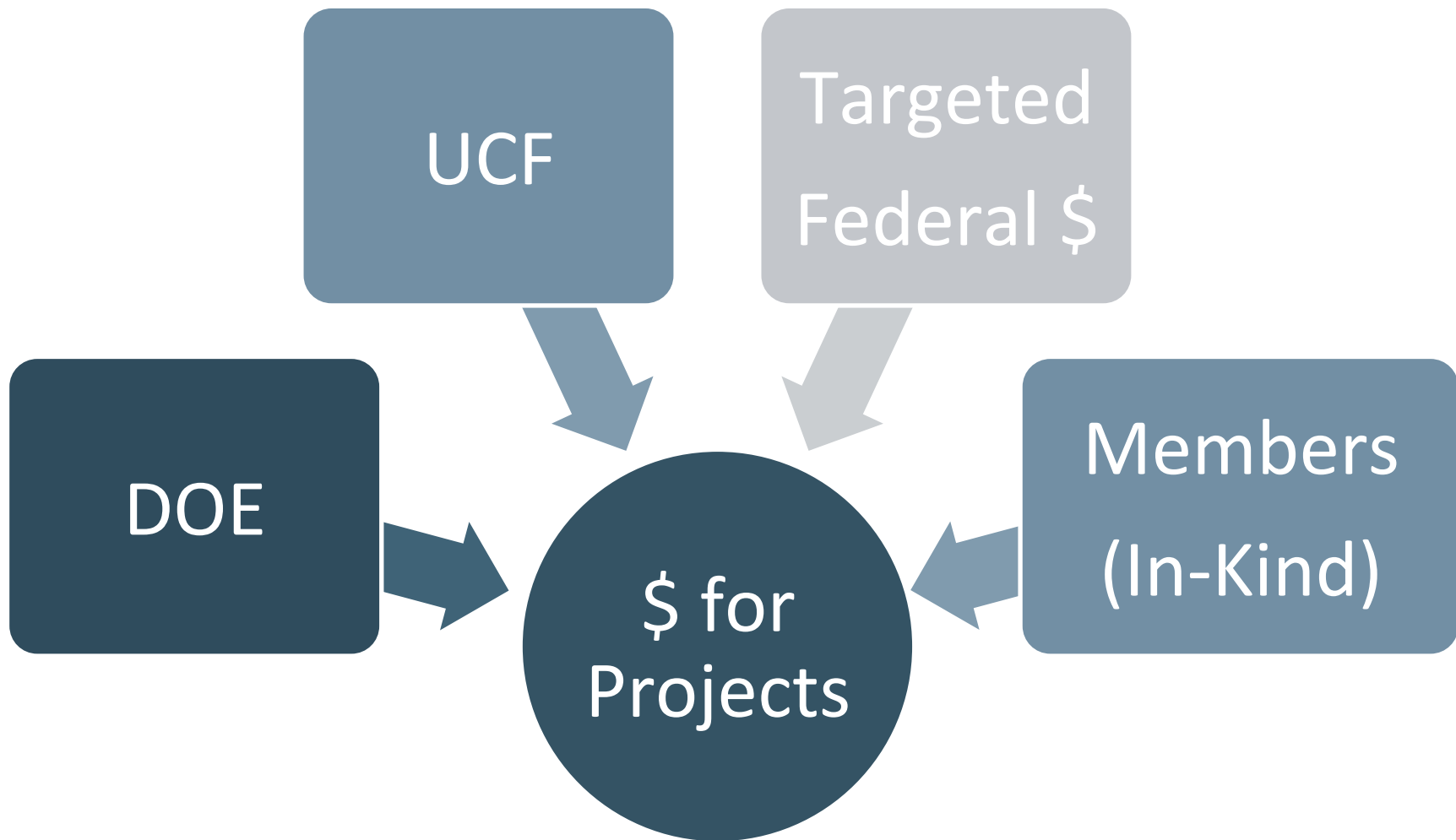


## Wafering



All members engaged in multiple c-Si program projects

# \$ for R&D Projects

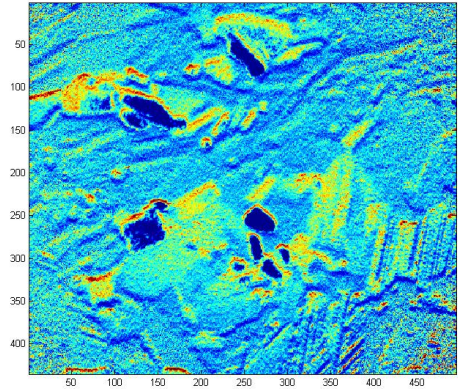


# Initial c-Si PVMC Program Areas

## 1. In-line/Off-line Metrology

### Primary Goals

- Identify critical industry challenges/needs in metrology and rank
- **Participate and support c-Si standards development/roadmapping efforts**
- Develop projects to demonstrate new c-Si metrology technologies
- Build infrastructure to support metrology programs
- Transition new metrology technologies into pilot and manufacturing lines



Courtesy of Polaritek

## 2. Feedstock/Wafering Methodologies

### Primary Goals

- Identify critical industry needs in feedstock and metrology
- **Participate and support c-Si standards development/roadmapping efforts**
- Establish c-Si feedstock/wafering programs to accelerate transition of new technologies into mainstream manufacturing
- Provide/foster process, test, and demonstration activities to validate new technologies and identify barriers



Courtesy of AMAT

# c-Si PVMC Workshops

Tethered to Major Conferences (Intersolar NA, IEEE-PVSC)

- Annual c-Si workshops (focused topics – list challenges)
  - 2012: separate c-Si metrology, FS/W workshop
  - 2013: joint c-Si programs workshop
  - 2013: metrology challenges for advanced cell architectures
  - 2014: diamond wire saw challenges
- SDO Forum (3<sup>rd</sup> annual meeting June, 2014)
  - SEMI, IEC, ASTM, UL, Solar ABCs, TUV-Rhineland, U.S. TAG , Cal Fire, Cal Energy, Module QA Task Force
  - Updates, plans, coordinate overlaps, identify needs
  - Plan to invite ITRI 2015
  - Goal is to communicate, educate, coordinate diverse SDO activities
    - Identify gaps and overlaps
- Archives at <http://uspvmc.org/proceedings.html>

# 4<sup>th</sup> Annual SDO Forum

- Co-locate with 42<sup>nd</sup> IEEE-PVSC
  - New Orleans, LA
  - June 14 - 20, 2015
    - Most likely: Wednesday evening , 6/17/2015
- SEMI, IEC, ASTM, UL, Solar ABCs, TUV-Rhineland, U.S. TAG , Cal Fire, Cal Energy, Module QA Task Force, ITRI are expected participants
  - Are there others we should be engaging?
- Organizing Committee forms 1Q2015
- Any interest – contact me directly
  - [andy.rudack@uspvmc.org](mailto:andy.rudack@uspvmc.org)



Thanks, Solar ABCs!

Any ?s