Process Development and Integration Lab

+ Measurements and Characterization

PDIL Presentations
  PDIL Introduction
  Thin-Si Platform
  Si Wafer Replacement Platform
  CIGS Platform
  CdTe Platform
  Atmospheric Processing Platform
  M&C Platform and Standalone Capabilities
  Data Integration

M&C Overview

NREL/PR-520-43173
Presented at the Solar Energy Technologies Program (SETP) Annual Program Review Meeting held April 22-24, 2008 in Austin, Texas

Austin Airport Marriott South
Austin, TX April 22-24, 2008
2008 Solar Annual Review Meeting

PDIL Overview

Brent P. Nelson
PDIL Vision

- Integrate deposition, characterization, and processing
  - Flexible and robust
  - Standardized transfer interface
  - Controlled sample ambient between tools

- Benefits
  - Answers to previously inaccessible research questions
  - Control and characterization of critical surfaces (interfaces) and how their impact on subsequent layers
  - Assess process-related source chemistry, surface chemistry and kinetics, and bulk reconstruction
  - Grow layers and alter interfaces using controlled processes and transfer ambients (without exposure to air)
  - Develop new techniques, methodologies, device structures, materials, and tools (growth, processing, and analytical)
  - Improved collaborations with university and industry researchers
The PDIL = Collaborative Facility
- work closely with NREL scientists
- integrated equipment
- answer pressing PV related questions
PDIL Implementation

Stand-Alone Tools

- Disconnect Point
- Transport Pod (mobile)
- Chamber

Platform: Robotic Transfer

- NREL Chambers
- Transport Pod (mobile)
- Industry Chamber
- Robotic Transfer (intra-tool)

Inter-Tool Transport
PDIL Equipment Platforms

1) CIGS Platform
2) Atm. Processing
3) Silicon Platform
4) Si / CdTe
5) M&C Stand-Alone
6) M&C Integrated
### PV Technology Road Map Support

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Steps in Custom Equipment Acquisition

1. Define Research Need
2. Concept Specification
3. Technical Review
4. Rescoped Specifications
5. Obtain Budgetary Quotes
6. Final Specifications
7. PR Placed
8. PR Assigned to Buyer
9. PR Legal Review
10. RFQ to Potential Vendors
11. Bids Received
12. Vendor Selected
13. PO Legal Review
14. PO Placed
15. "To-Build" Drawings
16. Drawings Accepted
17. Equipment Fabrication
18. Acceptance at Vendor
19. Delivered to NREL
20. Equipment Installation
21. Acceptance at NREL
22. Operational
## Thin-Silicon Platform

Qi Wang

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