PV MANUFACTURING INITIATIVE

Background and Status

February 2, 2006
Background

October 2003  Meeting with PV industry at Georgia Tech to discuss manufacturing issues
September 2004  Contract issued by NREL
December 2004  Georgia Tech team, R. Matson, G. Doyle visit companies
April 2005  Laboratory in preparation at Georgia Tech

Other events:
October 2004 – April 2005  Visits to NREL and PV Manufacturers

Ongoing events:
Weekly telecoms with NREL
NREL using GT software, CAMX Message Broker, to exchange test information
Project discussions with BP Solar
Equipment Vendors Workshop – February 2, 2006
Manufacturers Workshop - TBD
# Georgia Tech Faculty and Students

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Georgia Tech Programs in PV

University Center of Excellence for Photovoltaics

PV Manufacturing Initiative

Center for Organic Photonics and Electronics (COPE)

Crystalline-Silicon Processing and Design

Thin-Wafer Manufacture and Handling

Organic Solar Cell Research

High Efficiency Cells
- High Throughput Technologies [RTP/PECVD/SPC]
- Thin-Layer Growth
- Novel Furnace Technologies

Wafer Saw/Cut Technologies

Residual Stress Measurements

Physical Handling/transport

Factory-Floor Communication

......[Software Tools]

Efficiency Issues

Pantacene + C60 (Buckyballs)
Interaction with Industry

**PV MANUFACTURING Initiative**

- Residual Stress
- EFG Thin-Wafer Growth
- Thin Ribbon Handling
- Factory Software
- Wafering
- Handling
- Residual Stress
- Factory Software
- Residual Stress
- Ribbon Growth

**WAFFER/CELL MANUFACTURERS**

- **RWE Schott Solar**
- **Shell Solar**
- **BP Solar**
- **Evergreen Solar**

**EQUIPMENT MANUFACTURERS**

**MARC/GIT**
PV Manufacturing Initiative at MARC/GIT

Flexible Manufacturing Testbed

UCEP

mcSi Cell/Module Manufacturing

COPE

PV Equipment/Tool Manufacturers
Objectives

Address handling, inspection and process control issues in thin multi-crystalline silicon wafers.

Tasks:

- Analyze, optimize and develop new methods for handling (e.g. gripping) thin wafers (≤ 200 μm)
- Diagnostics and inspection techniques
  - Residual stresses; edge crack detection
- Process control in PV manufacturing
  - Machine and factory monitoring and communication software/standards
Methods

Investigate various gripping strategies for thin wafers.

Integrate Polariscopy method to inspect wafers with gripping and positioning.

Developing software for communication, monitoring and control of a prototype line.