Thrust: Silicon Absorbers and Cells

Key Challenges

Silicon-based solar cells are the dominant PV technology today with more than 80% market share. The research infrastructure is equally strong. This thrust must focus on those challenges with the greatest opportunities for successful university research. The key challenges which are being addressed to enable high volume manufacturing of high efficiency Si cells are listed below:

1. Commercially viable manufacturing of thin crystalline Si solar cells below 50um
2. Fundamental science of crystal growth and bulk defects for low-cost, high-quality ingots
3. Passivation of thin crystalline Si to meet the high efficiency targets
4. Absorption of all available light within a reduced absorber volume
5. Metallization and packaging of thin Si cells into lightweight modules

Existing Projects in our Thrust

- *High Efficiency Ultrathin Silicon Solar Cells*, Yi Cui (Stanford)
- *Thin Crystalline RPCVD Back Contact Cells*, Sanjay Banerjee (Texas)
- *Laser Wafering*, Stuart Bowden (Arizona State)
- *Module Interconnects and Crystalline Film Silicon by Atmospheric Pressure Processing*, van Hest (NREL)
- *High-resolution, High-speed Printing of PV Contacts*, Vivek Subramanian (Berkeley)

Potential New Areas of Interest

- Processes for thin Si absorber preparation, such as spalling, epi-lift-off, templated growth, etc.
- Fundamental science of crystal growth and bulk defects for low-cost, high-quality ingots
- Methods for nano-texturing on thin Si surfaces, such as colloidal lithography, nano-imprint, etc.
- Improved passivation of thin crystalline Si foils including passivation of nano-textured surfaces
- Printing contacts on thin Si foils, including liquid precursor development