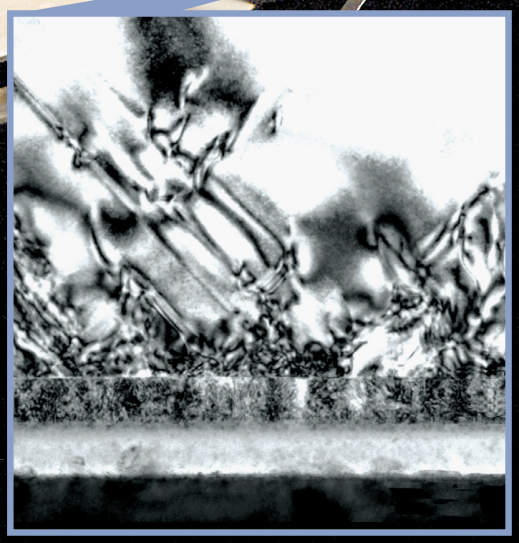
ACSi

Aligned-Crystalline Silicon Films on Non-Single-Crystalline Substrates

Ion Beam Assisted Deposition Technology (IBAD)



Silicon films with near-single-crystalline quality and high carrier mobility

Continuous production on inexpensive, flexible, non-single-crystalline substrates

Fundamental impact on semiconductor industry: thin-film transistors and solar cells

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EST. 1943

Licensable Technologies

Aligned Crystalline Silicon (ACSi)

Applications:

- Solar Cells
- Sensors
- Flat Panels
- IC Circuits

Benefits:

- Optimizes performance/cost compared with high-performance, high-cost single-crystal wafer and low-performance, low-cost amorphous film solar cells.
- Potential for high efficiency, high-performance, low cost, low weight solar cells.
- Customizable to specific application, adaptable to evolving technology.
- Manufacturing cost savings, ease of installation.

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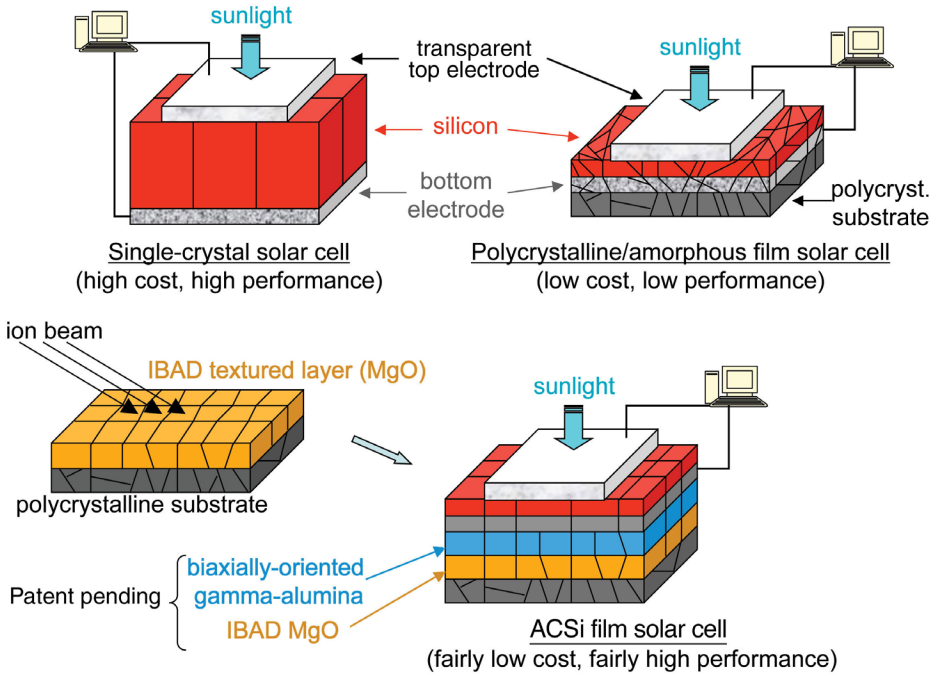

Summary:

Los Alamos National Laboratory (LANL) has applied its ion beam assisted deposition (IBAD) texturing technology to solving a significant problem that commonly arises during development of many thin-film semiconductor sensor and device applications. The lack of a suitable epitaxial template for the growth of well-oriented films produces major technical difficulties during development of these applications. Most cases require single-crystal templates that are usually expensive and/or available for only a limited number of materials. For example, photovoltaic energy conversion efficiency for expensive solar cells that use bulk, single-crystalline silicon can exceed 24%, whereas inexpensive solar cells based on amorphous silicon films seldom surpass 8% efficiency. Thus, a technology that allows one to approach the efficiency of single-crystalline silicon with the cost advantages of thin film architectures should be very useful to the industry.

LANL's ACSi technology promises to combine the high-performance aspects of single-crystalline silicon with the cost benefits of inexpensive substrates. Specifically, we have recently demonstrated growth of nearly single-crystalline, high-carrier-mobility, Si thin films on flexible, polycrystalline, metal-alloy tapes by incorporating an ion-beam-textured buffer layer.

Development Stage:

This technology has been proven and replicated in the laboratory and results have been published in a peer-reviewed journal [Findikoglu et al., Adv. Mater. 17, 1527 (2005)]. We are looking for a licensee or a cooperative research partner to help us develop a complete solar cell prototype using this method.

Patent Status: U.S. Patent 7,288,332 Conductive layer for biaxially oriented semiconductor film growth

Licensing Status: Available for exclusive and non-exclusive licensing.

www.lanl.gov/partnerships/license/technologies/

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