

Addressing the Dollar Per Watt Challenge in Solar



Researchers and businesses around the world are seeking ways to make electricity from solar energy cost-competitive with conventional energy sources.

SRI has been influencing the solar industry since 1956 when we co-sponsored the world's first major conference on solar energy. Today, we are developing new processes to make low-cost silicon and help clients address market challenges. SRI is a natural partner for those seeking to understand where the industry is heading and who want to drive technology forward.

Working with SRI

Companies turn to SRI for our intellectual power, specialized facilities and tools, and ability to solve problems, leveraging our cross-disciplinary capabilities in areas such as engineering, optics, and materials science.

We address research challenges collaboratively to bring technology to market. We may be the leader, or you may be the leader: together, we can develop solutions to meet your needs.

Making It Real

One of SRI's greatest strengths is transforming ideas into tangible commercial products. Our engineering group develops

operationally effective systems and provides engineering research, systems engineering, testing, and integration services for commercial and governmental clients worldwide.

Working with SRI, you can depend on effective planning, efficient execution, and on-time, quality delivery. We help get your ideas to market faster.

What We Offer

- *Customer-focused solar solutions*
- *Partnerships to address industry challenges*
- *Intellectual property for license*
- *Unparalleled expertise*
 - *Materials development, production, purification, deposition, and characterization*
 - *Engineering, design, and modeling of solar components and systems*
 - *Optics*
 - *Power electronics*
- *Specialized facilities for modeling, development, and experimental testing of solar solutions:*
 - *Knudsen cell mass spectrometer for high-temperature thermochemical studies*
 - *Pilot-scale reactors for solar-grade silicon production*
 - *Bench-scale high-temperature systems for recycling silicon fines*
 - *Experimental reactors to deposit crystalline silicon films for solar cells*

Intellectual Property for License

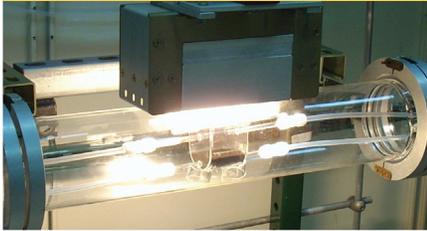
SRI's diverse technology portfolio represents some of our most exciting opportunities for clients to bring new and improved technologies to market.

For example, our process for low-cost solar-grade silicon production is available for license. This process

- *Operates at atmospheric pressure*
- *Is suited to use in single crystal, polycrystalline, or silicon film ribbon production*
- *Produces high-purity silicon (<0.02 ppm impurities)*
- *Produces silicon at scale with low capital expenditure*

SRI Technologies in Development

- *Polycrystalline silicon film and solar cells by chemical vapor deposition—fluidized bed reactor*
- *Purification and consolidation of silicon fines*
- *Integrated PV power tiles*
- *Nanomaterials for solar applications*
- *Novel concepts to produce silane*
- *Transparent conductors*



Chemical vapor deposition
— fluidized bed reactor to
deposit silicon

Case Study: High-Speed, Low-Cost Deposition of Silicon Films

To achieve grid parity, fundamentally new approaches are needed to produce electricity from solar energy. One SRI approach combines a well-understood method for depositing materials—chemical vapor deposition—with a widely used reactor design, the fluidized bed reactor.

In a pilot reactor, SRI researchers are demonstrating how these technologies can be used together to quickly deposit high-quality crystalline silicon films. SRI expects the technology to reduce the amount of silicon needed for solar cells and dramatically reduce cell manufacturing costs.

According to SRI's Angel Sanjurjo, Ph.D., one of the technology's inventors, developing the concept "requires SRI's unique mix of knowledge from multiple disciplines, including chemistry, chemical engineering, and materials science. Familiarity with both semiconductor processing and solar cell fabrication are also important."

The next step for this technology's development could include working with commercial partners to develop a tool so the technology can be used commercially.

Contact Us

For anyone involved in the development of solar and solar-related products, SRI can be an invaluable resource. To work with us, contact:

Barbara Heydorn

Director
Center of Excellence in Energy
barbara.heydorn@sri.com
energy-center@sri.com
650.859.5717



About SRI International

Silicon Valley-based SRI International, a nonprofit research and development organization, performs sponsored R&D for governments, businesses, and foundations. SRI brings its innovations to the marketplace through technology licensing, new products, and spin-off ventures. Commemorating its 65th anniversary in 2011, SRI is known for world-changing innovations in computing, health and pharmaceuticals, chemistry and materials, sensing, energy, education, national defense, and more.

Headquarters: Silicon Valley

SRI International

333 Ravenswood Avenue
Menlo Park, California 94025-3493
650.859.2000

Washington, D.C.

SRI International

1100 Wilson Blvd., Suite 2800
Arlington, Virginia 22209-3915
703.524.2053

Princeton, New Jersey

SRI International Sarnoff

201 Washington Road
Princeton, New Jersey 08540-6449
609.734.2000

*Additional U.S. and
international locations*

www.sri.com/energy

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