

**FOR IMMEDIATE RELEASE: 31 May 2015**

TSS-02-2015

Media Contacts:

Paul Stassen

TULiPPS B.V., [stassen@tulipps.com](mailto:stassen@tulipps.com)

Phone: +31.40.7516.290

or

Peggy Malnati

Malnati & Associates, [peggy@malnatiandassociates.com](mailto:peggy@malnatiandassociates.com),

Phone: +1.248.592.0765 or Skype: pmalnati

or

Bram Verschoor

Eurotron B.V., [bram@eurotron.nl](mailto:bram@eurotron.nl)

Phone: +31.184.691105

## **Ultra-Thin Chemically Treated Glass/Glass Modules & Back-Contact Cells Add Value, Options on COSMOS® Modules**

**EINDHOVEN, The Netherlands** – In order to offer module makers and solar photovoltaic (PV) customers greater value and design flexibility, solar research and development company, TULiPPS B.V. will offer a combination of ultra-thin chemically strengthened glass from Asahi Glass Co. Ltd. (AGC, Tokyo, <http://www.agc.com/english/index.html>) in a frameless glass/glass module system with high-efficiency back-contact cells produced on equipment from Eurotron B.V. (Bleskensgraaf, The Netherlands, <http://www.eurotron.nl>). Versus conventional framed PV modules, this new combination offers the increased break resistance, light transmittance, and energy-generating efficiency/unit area at the lower module weight and cost of all TULiPPS' module systems plus greater durability, longer service life, and the design and manufacturing flexibility to create modules of varying sizes that better fit odd spaces on roofs and cladding for building-integrated PV (BIPV) systems.

*-more-*

TULiPPS to Offer Frameless Ultra-Thin Glass/Glass Modules with Back-Contact Cells  
2-2-2-2

The new ultra-thin chemically strengthened glass is called *Leoflex™* by producer, Asahi Glass and is commercially available in thicknesses of 0.85mm and 1.10mm (0.03 and 0.04 inches). Chemical tempering via an ionic surface treatment creates a compressive stress layer on both skins of the glass. This strengthens the glass without making it more brittle. *Leoflex* glass at 0.85mm/0.03 inch offers the following properties vs. thermally strengthened 3.2mm/0.13 inch conventional solar glass:

- Strength/marginal stress: 260 MPa vs. 80 MPa,
- Young's modulus: 74 vs. 70 GPa,
- Poisson's ratio: 0.23 vs. 0.20,
- Density: 2.48 vs. 2.50, and
- Vicker's hardness: 673 vs. 527.

Even at these greatly reduced thicknesses, *Leoflex* glass is five-times stronger than thermally tempered soda-lime glass and is resistant to cracking, which in turn facilitates the production of lighter weight and tougher components in applications such as solar panels, building cladding, and lighting. It also is highly resistant to scratching, offers outstanding weatherability, and has high optical clarity. In fact, viewed from the side, *Leoflex* glass displays none of the green tint typical of other types of glass. Furthermore, because of the ionic surface treatment — where potassium (K) ions replace sodium (Na) ions — there is less migration of corrosive sodium ions off the inward surface(s) of the glass that touch solar cells, and therefore there is less potential induced degradation (PID) of the electrical junction.

*Leoflex* glass can be used two different ways in the COSMOS frameless module system: as both the front- and backsheet of ultra-thin glass/glass modules (replacing the polymer backsheet) or as the backsheet of slightly thicker glass/glass modules that utilize thermally tempered glass front-sheets.

"The PV industry considers that glass/glass modules are the highest quality, longest lasting module technology," explains Paul Stasson, TULiPPS B.V. founder and managing director. "We wanted a lightweight glass/glass option for our COSMOS technology platform. With the Asahi glass system, we can make a 2mm glass/glass module system that is the same weight as our 2mm thermally tempered single-layer glass module system with polymer backsheet. This makes our system more durable plus gives module makers more module construction options. Furthermore, Asahi's state-of-the-art glass is not a developmental product, but already is available in commercial quantities. Thanks to expanded capacity and higher production volumes, prices have been lowered significantly.

-more-

### TULiPPS to Offer Frameless Ultra-Thin Glass/Glass Modules with Back-Contact Cells 3-3-3-3

The technology for producing modules containing back-contact cells is provided by Eurotron, the leading equipment supplier of automated, high-speed production of a broad range of back-contact type solar PV modules. A key aspect of back-contact construction is that it changes the architecture of solar modules, which impacts energy efficiency per square area, module longevity, aesthetics, and manufacturing flexibility — very-useful benefits for module makers and solar customers.

Conventional PV cells feature a grid of soldered metalized circuits (traces) on both front and back sides with positive and negative poles separated. Although circuits on the front of cells are thin, collectively their real estate represents areas of the module that are covered, so incapable of collecting energy, which reduces module energy efficiency. In contrast, with back-contact cells both positive and negative poles are moved to the back side of the module. This opens up the entire front surface of modules to collect energy while also allowing cells to be packaged more densely, boosting efficiency per square area by several percentage points. That, in turn, means smaller solar panels can collect the same amount of energy, or the same size panels can collect more energy. Since the conductive adhesive used with back-contact cells is also more ductile than soldered metal, cell longevity is increased, even in demanding environments, making modules more reliable. The change in architecture also means that modules using back-contact cells have a more uniform and attractive appearance, which is considered a plus for BIPV applications.

Another advantage of back-contact technology is its manufacturing flexibility. Conventional cells are connected to each other in long strings via solder and copper wire using special tools called stringers. Because positive and negative poles are on different sides of the cell, the stringing and connection processes are non-planar so are labor intensive, which limits throughput. The process does not lend itself to use with thin cells, as the resulting strings are fragile, and creating different cell patterns requires significant work and therefore results in higher costs, which further inhibits the availability of different module sizes and configurations. Moreover, losses due to encapsulation and interconnect resistance can top 4-5%, which again reduces module efficiency.

*-more-*

TULiPPS to Offer Frameless Ultra-Thin Glass/Glass Modules with Back-Contact Cells  
4-4-4-4

However, with back-contact cells, both poles are on the same surface, so assembly can proceed in a co-planar manner, which is far more amenable to automation and use of rapid pick-and-place tools. In fact, cells can be connected during the lamination step, increasing throughput while reducing production costs. This planar geometry also allows for closer cell spacing as previously noted (hence higher cell density), can accommodate thinner, larger cells, and also makes it easier to change cell configuration without a major cost penalty. Back-contact technology also nearly eliminates cell-to-module losses regardless of the rest of the module configuration.

"Just as surface-mount technology (SMT) has replaced soldered components on circuit boards," explains Stassen, "back-contact cell technology is replacing soldered cells on PV modules. The greater durability, density, aesthetics, and manufacturing flexibility of back-contact systems perfectly complement what we are trying to do with our COSMOS BIPV technology platform. It allows us to create a better looking module in a much broader range of shapes and sizes at no cost penalty. It also enhances module use life and efficiency, which in turn helps reduce the cost of PV ownership and extend its use life — a win-win situation. And regardless of what type of back-contact system is used, Eurotron's unique technology offers the most efficient and best process for producing PV modules with back-contact cells."

Those planning to attend the [Intersolar Europe](#) exhibition and conference in Munich, Germany from *June 10-12, 2015* can view the technology (for both pitched roof and cladding) in **Booth A3.277**.

Stassen adds, "The close cooperation between TULiPPS, Asahi, and Eurotron has made this unique new combination of frameless ultra-thin glass/glass modules with back-contact cells a commercial reality for module producers."

Founded in 1907, the AGC Group, with Tokyo-based Asahi Glass Co., Ltd. at its core, is one of the world's major suppliers of flat, automotive, solar, and display glass, chemicals, and other high-tech materials and components. In 2011, the company has global sales of €11-billion and over 51,000 employees around the world. Learn more: <http://www.agc.com/english/index.html>.

-more-

TULiPPS to Offer Frameless Ultra-Thin Glass/Glass Modules with Back-Contact Cells  
6-6-6-6

Headquartered at the Eindhoven High Tech Campus, **TULiPPS B.V.** was the 2012 winner of the Dutch Solar Award in the Industry Development category for its innovative COSMOS<sup>®</sup> module technology platform, which was developed cooperatively with partners from the plastics/composites, automotive, PV module, roofing, and PV installer market segments. Further, TULiPPS is the consortium leader for the SUMMIT<sup>1</sup> consortium under the European Union Seventh Framework Programme FP7/2007-2013 as well as the LiRoB<sup>2</sup> Dutch Top-sector Knowledge and Innovation (TKI) solar demonstration project. Learn more: <http://www.tulipps.com/> and <http://www.summit-project.eu> or eMail: [tulipps@tulipps.com](mailto:tulipps@tulipps.com), or call: +31 (0) 40.7516.290, or send mail to: TULiPPS B.V., High Tech Campus 9, 5656 AE Eindhoven, The Netherlands, or follow [TULiPPS Solar on Facebook](#)<sup>\*</sup>.

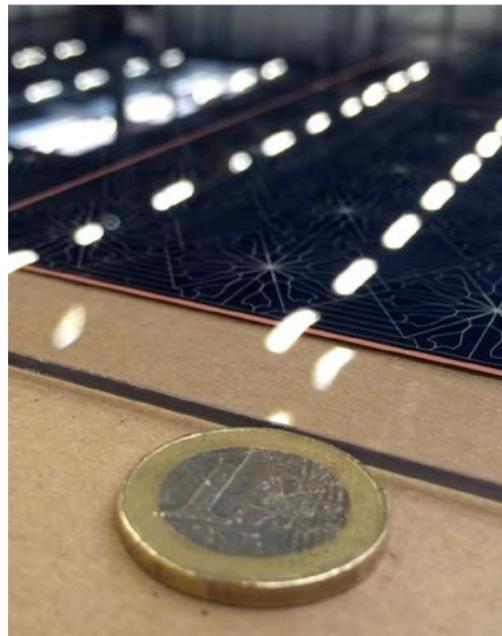
# # # # #

<sup>®</sup>TULiPPS and COSMOS are trademarks of TULiPPS Solar International B.V. \* All other trademarks are the property of their owners.

---

<sup>1</sup> SUMMIT is short for the project's title, **S**mart large lightweight long life **M**ultifunctional PV **M**odule **T**echnology for large power installations and distributed energy generation.

<sup>2</sup> LiRoB is an abbreviation for **L**ightweight **R**ooftop **B**IPV.



**FOR IMMEDIATE RELEASE: 31 May 2015**

TSS-02-2015

Media Contacts:

Paul Stassen, TULiPPS B.V., [stassen@tulipps.com](mailto:stassen@tulipps.com), Phone: +31.40.7516.290

or

Peggy Malnati, Malnati & Associates, [peggy@malnatiandassociates.com](mailto:peggy@malnatiandassociates.com), Phone: +1.248.592.0765

or

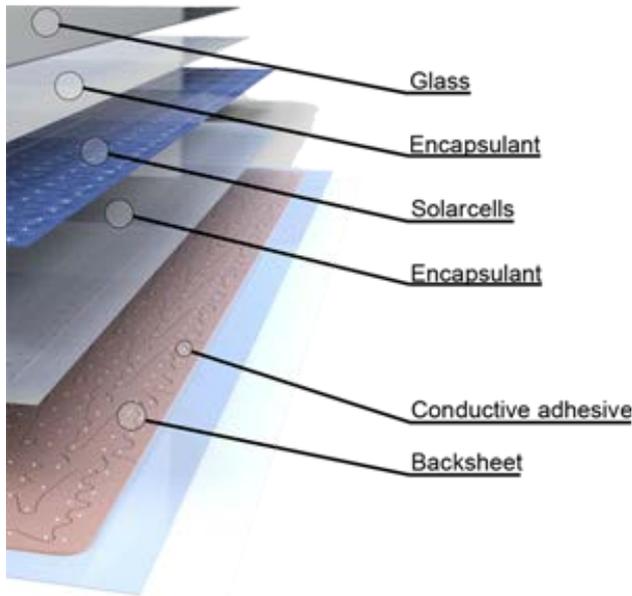
Bram Verschoor, Eurotron B.V., [bram@eurotron.nl](mailto:bram@eurotron.nl), Phone: +31.184.691105

**EINDHOVEN, The Netherlands** – Solar research and development company, TULiPPS B.V. will offer module makers ultra-thin chemically treated *Leoflex™* glass from Asahi Glass Co. Ltd. (AGC) in glass/glass modules with high-efficiency back-contact cells produced on equipment sold by Eurotron B.V. in TULiPP's patent-pending frameless module system for building-integrated photovoltaic (BIPV) modules. Chemical tempering creates a compressive stress layer on both skins of the glass, strengthening it without making it more brittle. *Leoflex* glass is commercially available in thicknesses of 0.85, and 1.10mm (0.03 and 0.04 inches). Even at these greatly reduced thicknesses (*photo on right shows it next to a €1 coin*), *Leoflex* glass is five-times stronger than thermally tempered soda-lime glass and is resistant to cracking, which in turn facilitates the production of lighter weight and tougher components in applications such as solar panels for building cladding (*photo on left*) and lighting. It also is highly resistant to scratching, offers outstanding weatherability, has high optical clarity, and reduces potential induced degradation (PID) of the electrical junction. In fact, viewed from the side, *Leoflex* glass displays none of the green tint typical of other types of glass.

# # # # #

®TULiPPS and COSMOS are trademarks of TULiPPS Solar International B.V. \* All other trademarks are the property of their owners.

High-resolution digital photography is available upon request.



**FOR IMMEDIATE RELEASE: 31 May 2015**  
TSS-02-2015

Media Contacts:

Paul Stassen, TULiPPS B.V., [stassen@tulipps.com](mailto:stassen@tulipps.com), Phone: +31.40.7516.290

or

Peggy Malnati, Malnati & Associates, [peggy@malnatiandassociates.com](mailto:peggy@malnatiandassociates.com), Phone: +1.248.592.0765

or

Bram Verschoor, Eurotron B.V., [bram@eurotron.nl](mailto:bram@eurotron.nl), Phone: +31.184.691105

**EINDHOVEN, The Netherlands** – In order to offer photovoltaic (PV) module makers greater value and manufacturing flexibility, solar research and development company, TULiPPS B.V. has teamed up with Asahi Glass Co. Ltd. (AGC) and Eurotron B.V. to offer ultra-thin chemically treated *Leoflex™* glass in glass/glass modules with high-efficiency back-contact cells in TULiPP's patent-pending frameless module system. Unique back-contact construction improves PV module energy efficiency per square area, longevity, aesthetics, and manufacturing flexibility — very-useful benefits for module makers and solar customers. By moving both positive and negative poles of electrical circuits to the back side of cells, more surface area of modules can be used to generate electricity, boosting module efficiency and creating a more uniform and attractive appearance. The co-planar poles make module manufacture easier to automate, increasing throughput while reducing production costs and limiting cell-to-module losses. This planar geometry also allows for closer cell spacing, accommodates thinner, larger cells, and makes it easier to change cell configuration without a major cost penalty.

# # # # #

®TULiPPS and COSMOS are trademarks of TULiPPS Solar International B.V. \* All other trademarks are the property of their owners.

High-resolution digital photography is available upon request.