

GREATCELL & SOLLIANCE SET A NEW WORLD RECORD – 13.5% R2R

Queanbeyan, 22 November 2017 – Greatcell Solar (ASX: GSL) is very pleased to announce that Solliance has again achieved a new world record for Perovskite Solar Cell Photovoltaic (PSC PV) technology demonstrated on industrially applicable Roll-to-Roll (R2R) processes of 13.5% conversion efficiency at cell level.

Please see Solliance's announcement below:

“Solliance sets more world records for R2R perovskite solar cells and modules”

Solliance has achieved world record cell-level conversion efficiency of 13.5% and module-level aperture area conversion efficiency of 12.2% for perovskite-based photovoltaics using industrially-applicable, roll-to-roll (R2R) production processes. Following the consortium's previous cell world record announced earlier this year, this latest breakthrough is another step towards the rapid introduction of this attractive, new type of efficient and low-cost solar cell technology.


Perovskites are, perhaps, the most exciting solar energy technology to appear in recent years. They promise high efficiency from relatively simple production processes, bringing the potential for cheaper, greener energy. Moreover, they can be processed into thin, lightweight and potentially semi-transparent modules for integration into windows or curved construction elements.

Solliance and its partners are helping to speed the market introduction of this technology by developing scalable, industrial processes for fabricating large-area modules. The goal is to enable seamless integration in a broad variety of new energy harvesting building blocks for infrastructure, building and vehicle construction and assembly.

In March this year, Solliance demonstrated R2R processes for both the electron transport and perovskite layers of the cells that make up such modules. Now, by further optimizing and re-validating these processes on its dual R2R coating line, Solliance has improved performance at both the cell and module level.

After selecting two foil zones of each about 10 meters in length with a visual good perovskite quality, but with different R2R settings, 20 individual 0.1 cm² solar cells were made in each zone. In one zone the maximum stabilized efficiency reached 13.5% (measured under maximum power point tracking conditions over 5 minutes) and in the second zone a maximum of 12.5% was reached. The average stabilized cell efficiency in the best performing zone was about 1% higher than the previously reported run in March 2017.

In addition, for each zone six 2 x 2 cm² or 4 cm² aperture modules, four 3.5 x 3.5 cm² or 10.5 cm² aperture modules and one 13 x 12.3 cm² or 160 cm² aperture module were produced by implementing a P1P2P3 laser scribe process with 100% yield over all 22 modules. For the modules prepared from the best performing zone, the smaller modules showed a maximum aperture stabilized efficiency of 12.1%, with an average of 11.1% across the six modules. The larger modules achieved a maximum aperture stabilized efficiency of 12.2% with an average of 11.0% across the four modules and the large module achieved an aperture stabilized efficiency of 10.5%.



All processing steps used low-cost materials and scalable processes at temperatures below 120°C. This highlights the potential for cost-effective, high-volume production of perovskite solar cells.

“These results show that the developed R2R process is very reproducible over different runs in time, which is very important for future reliable manufacturability”, explains Pim Groen, Professor of SMART materials at the Technical University of Delft and Program Manager at Holst Centre/Solliance.

“Perovskites have delivered incredible efficiencies in lab-scale photovoltaic cells. The challenge now is to upscale perovskite cells to larger modules with high efficiency and long lifetime at low cost. This demonstration of scalable roll-to-roll and sheet-to-sheet processes for the deposition of active layers and cell interconnections shows Solliance is excellently placed to realize this upscaling. We are confident of quickly boosting efficiencies above 15% for modules up to 30x30 cm². And our research shows that optimizing materials and processes is steadily improving the stability of perovskite devices under real life operational conditions,” explains Ronn Andriessen, Program Director at Solliance.

Solliance is a cross-border Dutch-Flemish-German thin-film photovoltaics research initiative. Its research on the development and applications of perovskite-based PV modules is carried out in conjunction with industrial partners Greatcell Solar Limited, Solartek and Panasonic.

Richard Caldwell, Managing Director of Greatcell Solar remarked:

“The metals project at Solliance is hitting its targets. The successful translation of this exciting PSC technology from the laboratory to the factory will open up massive commercial opportunities. A particularly pleasing feature of the current progress is the possibility to solar enable commercial and industrial roofing using low-cost R2R processes, thus opening up a whole new space to capture the Sun’s energy, all day, every day.”

About GREATCELL SOLAR LIMITED

Greatcell Solar is a global leader in the development and commercialisation of Perovskite Solar Cell (PSC) technology – 3rd Generation photovoltaic technology that can be applied to glass, metal, polymers or cement. Greatcell Solar manufactures and supplies high performance materials and is focused on the successful commercialisation of PSC photovoltaics. It is a publicly listed company: Australian Securities Exchange ASX (GSL) and German Open Market (D5I). Learn more at www.greatcellsolar.com and subscribe to our mailing list in English and German.

About SOLLIANCE

Solliance is a partnership of R&D organizations from the Netherlands, Belgium and Germany working in thin film photovoltaic solar energy (TFPV). In order to strengthen the region’s position as a world player in PV, Solliance is creating the required synergy by consolidating and coordinating the activities of 250 researchers in industry, at research institutes and universities. Various state-of-the-art laboratories and pilot production lines are jointly used for dedicated research programs which are executed in close cooperation with the solar business community. Solliance partners are: ECN, imec, TNO, Holst Centre, TU/e, Forschungszentrum Jülich, University Hasselt and Delft University of Technology. Solliance offers participation in its research programs and opens up its lab facilities to new entrants, either from industry or in research. On the basis of clear Intellectual Property (IP) agreements, each industrial partner can participate in this research effort, or alternatively, hire equipment and experts to further develop its own technology.

About PEROVSKITE SOLAR CELL TECHNOLOGY

Perovskite Solar Cell (PSC) technology is a photovoltaic (PV) technology based on applying low cost materials in a series of ultrathin layers encapsulated by protective sealants. Greatcell Solar’s technology has lower embodied energy in manufacture, produces stable electrical current, and has a strong competitive advantage in low light conditions relative to incumbent PV technologies. This technology can be directly integrated into the building envelope to achieve highly competitive building integrated photovoltaics (BIPV).

The key material layers include a hybrid organic-inorganic halide-based perovskite light absorber and nano-porous metal oxide of titanium oxide. Light striking the absorber promotes an electron into the excited state, followed by a rapid electron transfer and collection by the titania layer. Meanwhile, the remaining positive charge is transferred to the opposite electrode, thereby generating an electrical current.

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