ASX ANNOUNCEMENT

27th August 2025

Graphene enhanced perovskite solar cells improve efficiency and reduce production costs

Highlights

- **Addition of graphene to perovskite solar cells (PSC) shown to improve efficiency two-fold and reduce production costs by up to 80%**
- **Cost-effective production allows scale up of volume and increases product competitiveness**
- **Partnership with Halocell and QUT helping deliver upward trend in commercial sales of ultra low-cost perovskite solar cells since launch to market last year**
- **More than 40 device categories identified to benefit from PSC application with significant market growth opportunities**

First Graphene Limited (ASX: FGR; "First Graphene" or "the Company") is pleased to provide an update on its partnership with Halocell Energy (Halocell) and Queensland University of Technology (QUT) to develop graphene enhanced perovskite solar cells (PSC).

Through the addition of First Graphene's novel functionalised graphene, Halocell's photovoltaic (PV) PSC has almost doubled in efficiency to 30.6%, while reducing production costs by up to 80%.

This is predominantly achieved through the Company's graphene formulations being compatible with roll-to-roll (R2R) dispersion technology, which eliminates traditional high conductor and high-cost materials such as gold and silver from PSCs (see Figure 1).

Figure 1: R2R technology at work in Halocell's Wagga Wagga facility.

R2R is the cheapest PSC manufacture method, providing a rapidly scalable production technique, introducing cost and volume efficiencies that gives Halocell's cells market advantage against competitors.

Cells made with alternative carbon-based materials such as graphene (see Figure 2) have widely been found to outperform conventional silicon cells in low and artificial light conditions, including indoor environments, generating and supplying power for niche applications.

Perovskites generally lower PV material, processing and energy costs associated with manufacture significantly compared to traditional silicon-based PVs. Their energy payback period has been calculated to be as low as six weeks compared to silicon cells which take approximately two years.

Technology development and performance has created a level of PSC efficiency in the last decade that took 40 years to achieve in silicon-based cells.

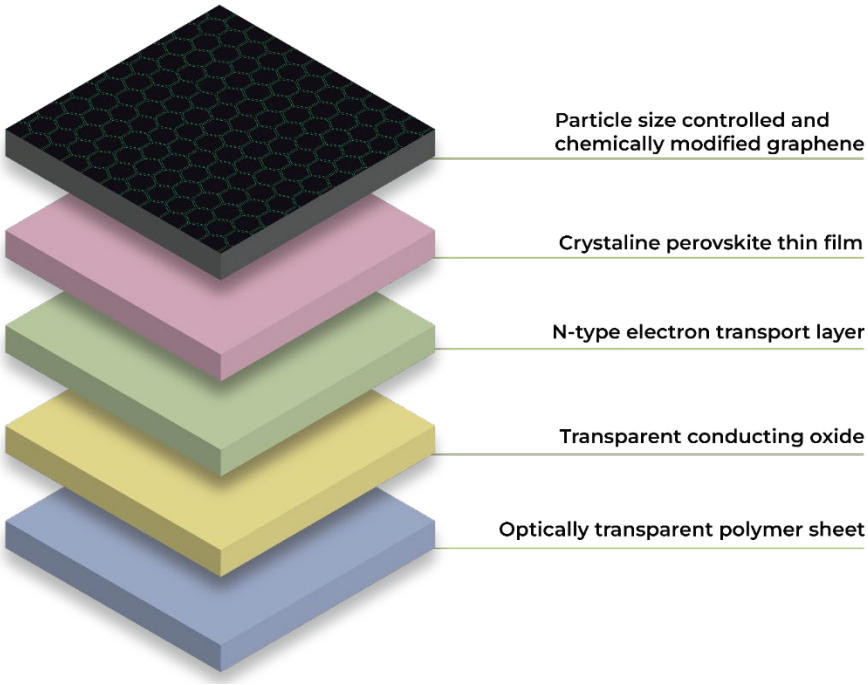

Figure 2: Typical perovskite solar cell layers including graphene carbon backing.

Research partnership leading to commercial opportunities

FGR's research and development partnership with Halocell and QUT started in 2023 and continues to be funded through a three-year AU$2.03 million grant from the Federal Government's Cooperative Research Centres Projects (CRC-P).

To assist ongoing development of graphene-enhanced PSCs, First Graphene entered a two-year commercial agreement to supply Halocell with its PureGRAPH® for use as a high performing coating in their cells last year (refer ASX announcement 26 September 2024).

Since late 2024 Halocell has been selling indoor, low-light PSCs to the Australian market, typically used in small electronic items.

PSCs are widely considered the best solution to replace hundreds of millions of batteries used in small everyday electronic devices such as TV remotes, calculators, toys, lights and torches, e-readers and tracking devices.

They can also be applied to high-end devices such as satellite solar modules, fixed wing drones, shark detectors, biomedical sensors and weather stations.

Halocell has identified 44 devices used across the IoT, electronics, space, aviation and full sun sectors that its PSC technology could be applied to.

Halocell is in the process of planning and seeking capital to expand its Wagga Wagga plant capacity through modular expansion of R2R production lines and boosting operating capability, with a view to eventually manufacturing up to 60 million PSC units annually.

First Graphene Managing Director and CEO Michael Bell said:

"We're pleased with the progress Halocell has made applying our PureGRAPH® to its perovskite solar cell development, not only through our R&D collaboration but now in a commercial setting.

Halocell's ambient module product line has been commercially available since September last year, meaning our partnership is generating competitive Australian innovation with global reach.

Production of these cells fits with our decarbonisation mantra when applying graphene to materials, which is proven to improve product performance, extend life and dramatically lower production costs to create a highly competitive product available to market."

Halocell Energy CEO Paul Moonie said:

"Our approach to perovskite commercialisation has always been strong material science while keeping cost and processability in mind.

This collaboration project with First Graphene has delivered that, and we now have a suite of low-cost materials we can select for a range of PV applications we will deliver. In addition to improving the performance of our products, this locks in bespoke material from First Graphene as a secure and reliable supplier.

This material will be included in sales of our Ambient PV range already available for purchase as well as our drone and satellite PV modules.

I thank the Federal Government's Collaborative Research Centre program for its support, this not only adds value to our products, but also strengthens sovereign manufacturing in Australia."

-Ends-

This release has been approved for release by the Chairman.

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About First Graphene Ltd (ASX: FGR)

First Graphene Limited is focused on the development of advanced materials to help industry improve. The Company is a leading supplier of graphitic materials and product formulations with a specific commercial focus on large, high-growth global markets including cement and concrete; composites and plastics; coatings, adhesives, sealants and elastomers (CASE); and energy storage applications.

One of the key outcomes these advanced materials offer is the reduction of carbon dioxide emissions, whether directly through a reduction in output of these harmful greenhouse gases or lower energy usage requirements in manufacturing, or indirectly due to enhanced performance characteristics and extending the usable life of products.

First Graphene has a robust manufacturing platform based on captive and abundant supply of high-purity raw materials, and readily scalable technologies to meet growing market demand. As well as being the world's leading supplier of its own high performance PureGRAPH® graphene product range, the Company works with multiple industry partners around the world as a supplier of graphitic materials and partner to research, develop, test and facilitate the commercial marketing of a wide range of sector-specific chemical solutions.

First Graphene Ltd is publicly listed in Australia (ASX:FGR) and has a primary manufacturing base in Henderson, near Perth, WA. The Company is incorporated in the UK as First Graphene (UK) Ltd where it has a strong R&D capability.