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04 September 2024

Gelion plc
("Gelion" or the "Company" or the "Group")

GEN 3 Lithium-Sulfur delivers energy density above 400Wh/kg

Milestone underscores technological viability of Li-S battery technology for lightweight energy storage

Gelion (AIM: GELN), the Anglo-Australian battery innovator, has achieved a significant milestone in the development of its Next Generation ("GEN 3") Lithium-Sulfur (Li-S) battery technology.

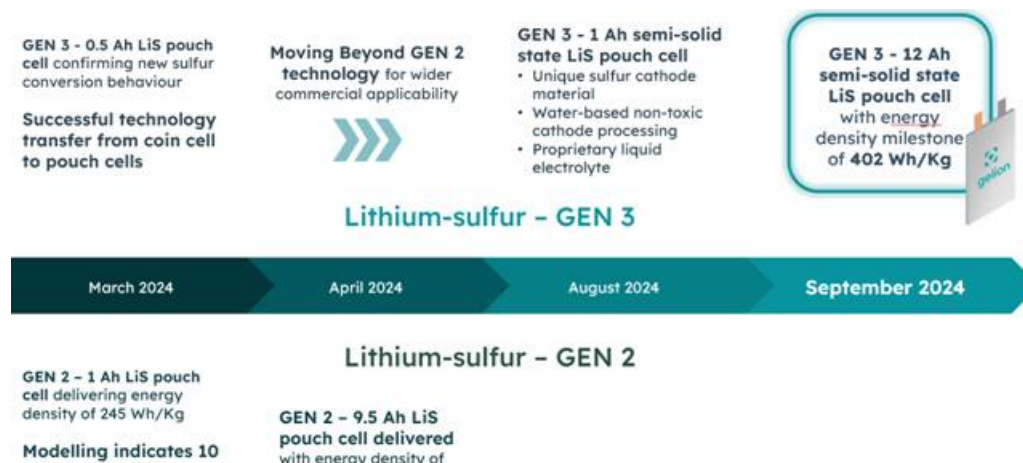
As predicted in the announcement on 15 August 2024, Gelion has now successfully achieved the energy density milestone of 402 Wh/Kg in a 12 Ah cell comprised of its GEN 3 semi-solid-state (see glossary) Li-S technology (see below for explanation of GEN 3 and semi-solid-state). The achieved energy density is 60-70% higher than current lithium-ion batteries (approximately 200-250 Wh/kg), meaning a single Gelion GEN 3 Li-S cell is over 60% lighter than a typical lithium-ion battery of the same energy.

This achievement demonstrates significant progress in the development of Gelion's innovative GEN 3 technology, which:

- exhibits high energy density
- avoids reactive additives
- uses a cathode that is prepared from commercially available materials and
- fabricated using a water-based (non-toxic) low energy (room temperature) self-assembly process, that can be adapted to existing gigafactory manufacturing equipment.

John Wood, CEO of Gelion commented on the development: *"We are thrilled to deliver on the expectation set out in our August update that our GEN 3 technology would deliver on the energy density milestone of 400 Wh/kg. This is significant and provides compelling evidence that our innovative GEN 3 approach to Li-S batteries has the potential to not only engineer batteries with excellent safety capabilities coupled with economical and sustainable manufacture, but also provides the exceptional energy for weight performance that make Li-S batteries such an attractive technology."*

Gelion's Li-S technology development pathway



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Glossary

Ah	Ampere hours. A measure of capacity stored in the cell. The larger the number the higher the capacity.
Energy density (Wh/kg)	The ratio of energy stored per unit weight i.e. Watt-hours per kilogram. The higher the number the lighter the battery.
Pouch cell	An industry standard format of a battery which comprises a flat pouch-shaped design with a multi-layered laminate structure.
Solid-to-solid conversion	A low or polysulfide-free conversion of sulfur within the cathode. Polysulfides are a dissolved form of sulfur that is corrosive and reduces cycle life in traditional lithium-sulfur batteries. Solid-to-solid conversion helps mitigate the formation of these polysulfides.
Semi-solid-state as a route to increased longevity/cycle life:	GEN 3 employs a semi-solid-state mechanism, maintaining the sulfur-based cathode materials in the cathode, preventing their diffusion into the electrolyte and diminishing associated battery degradation caused by reactive polysulfides. This approach mitigates the major degradation factor associated with conventional Li-S technology.

About Gelion

Gelion ("gel: ion") is a global energy storage innovator, supporting the transition to a more sustainable economy by commercialising two globally important next generation technologies: Lithium-Sulfur (Li-S) and Zinc-based (Zn) hybrid cells to electrify mobile and stationary applications. Gelion plc (the Group) is listed on the London Stock Exchange's AIM market and wholly owns Australia based Gelion Technologies Pty Ltd. Gelion is designing and delivering innovative battery technology to enable that transition and return value for its customers and investors.

Lithium Sulfur

Gelion's effort is directed at the potential for the Li-S chemistry to deliver double the gravimetric energy density of standard Lithium-ion chemistries whilst concurrently reducing cost and increasing safety, targeting the EV and e-aviation market, helping to make global transport, energy consumption and storage more sustainable.

Gelion is developing a GEN 3 Lithium Sulfur cell product for its high energy density sulfur cathode at its expanded R&D facilities in Australia and UK, enabling it to integrate with a variety of anodes ranging from graphite to silicon to lithium metal, depending on the targeted application.

Gelion's GEN 3 cell is unlocking the potential of sulfur batteries for a wide range of global mobile applications including electrical vertical-take-off-and-landing (eVTOL), drone markets, electric vehicles (EVs) and stationary energy storage (ESS).

Background on GEN 3 Lithium Sulfur

- **High energy density** - Energy density greater than 400 Wh/kg, when using a 10+ Ah pouch cell.
- **Semi-solid-state as a route to increased longevity/cycle life:** GEN 3 employs a semi-solid-state mechanism, maintaining the sulfur-based cathode materials in the cathode, preventing their diffusion into the electrolyte and diminishing associated battery degradation caused by reactive polysulfides. This approach mitigates the major degradation factor associated with conventional Li-S technology.
- **Increased sulfur utilisation:** GEN 3 demonstrates the full theoretical capacity of sulfur, i.e. a much higher sulfur utilisation than found in conventional Li-S approaches.
- **Simplified supply chain:** The innovative cathode is produced by mixing commercially available materials with abundant sulfur using a low-energy, room-temperature process, with potential to eliminate the need for pre-fabrication of the sulfur composite (sulfur composite is related to cathode active material in conventional lithium-ion batteries), streamlining the associated supply chain and production process and enabling localised manufacturing.
- **Environmental and economic benefits:** The water-based, standard-atmosphere cathode production process eliminates the need for toxic solvents, leading to significant cost savings and enhanced manufacturability.

GEN 3 uses the extensive network of Li-S technologies developed within Gelion and captured in the patents

GELN 3 uses the extensive network of L-S technologies developed within Gelion and contained in the patents acquired from Johnson Matthey in March 2023.

Zinc

Gelion is adapting its zinc technology to comprise an alternate cathode technology, a zinc hybrid cell to develop complementary next-generation batteries for the lead-acid eco-system. Early testing indicates that this solution has the potential to maintain good energy density levels with enhanced cost and safety aspects. Once fully developed, Gelion intends for its zinc technology to provide a durable and sustainable market extension within the ecosystem that supports lead-acid batteries.

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