Battery Energy Storage

February | 2020

BULLETIN

WHAT'S INSIDE!

Partnerships continue to bolster the development of batteries to ensure that demand of electric mobility is met by sufficient battery supply.

- **Toyota-Panasonic** partnership for prismatic batteries
- **Lucid Motor** with LG Chem for the supply of batteries for its Lucid Air sedan coming in Apr'20.
- Oil major **Indian Oil** with battery startup Phinergy to develop metal-air batteries.
- **Hydro-Québec & Mercedes** partnership aims to test new materials under field conditions.

Read our Spotlights to understand how Oil majors are partnering with battery startups to diversify their portfolio and how researchers are tuning supercapacitors to be flexible and fast charging :

- Fast-Charging, Long-Running, Flexible **Supercapacitor** developed by UCL
- Indian Oil Corp and Phinergy **sign** JV to produce metal-air batteries

Supercapacitors are attracting the limelight as both research work as well as funding are being directed towards improvements and mass production of the technology. Researchers at **UCL** have developed grapheme-based flexible, long running supercapacitor while as **Nawa Technology** has raised €13m in funding.

01 — **Toyota** and **Panasonic** will develop electric car batteries together

02 — New electrode designed by **MIT** may lead to more powerful solid-state batteries

03 — **Indian Oil** to team up with **Phinergy** to manufacture of metal-air batteries

04 — **Samsung SDI** and **Glencore** extend their long-term strategic cobalt partnership

05 — **Hydro-Québec** partners with **Mercedes-Benz** for solid-state battery technology

06 — Fast-Charging, long-running, flexible supercapacitor developed by **UCL**

07 — **Lucid Motors** announces long-term partnership with LG Chem for batteries for Lucid Air EV

08 — Novel EV battery material developed by **KIST** claims to double driving range and charge up to 80% in five minutes

09 — **Nawa Technology** raises €13 million to go into mass production

IndianOil

- Expert comment -

"We are confident that this Al-Air battery technology would complement Lithium ion batteries to provide a hybrid solution for large-scale adoption of electric vehicles in the country. Al-air battery technology has advantages on a number of factors like range, energy density, safety of operations, life-cycle etc., the India-centric."

Mr. Sanjiv Singh, Chairman, Indian Oil

03 February 2020

Panasonic and Toyota join forces to build prismatic batteries for EVs

Toyota and Panasonic have announced a new agreement to start jointly developing and manufacturing electric vehicle batteries.

- The new company will be called **Prime Planet Energy and Solutions**, and will start operating on 1 April 2020.
- It will work on the development and production of prismatic lithium-ion batteries for electric vehicles. It will also develop and manufacture more advanced energy storage technologies like solid state batteries.

Toyota will own 51% of the company, while Panasonic will hold the other 49%.

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03 February 2020

MIT researchers propose novel Li-metal electrode design for more powerful solid-state batteries

Researchers at MIT proposed a new design for electrodes based on using pure Li-metal as the anode which could lead to longer-lived batteries with higher energy densities.

- The design is part of a concept for developing safe all-solid-state batteries.
- The researchers developed a 3D nano-architecture in the form of a honeycomb-like array of hexagonal MIEC (Mixed ionic-Electronic Conductors) tubes, partially infused with the solid lithium metal to form one electrode of the battery, but with extra space left inside each tube.

Researchers claim that the present versions provide at least a 50% improvement in the amount of energy that can be stored for a given weight, with much better cycling stability.

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04 February 2020

Indian Oil Corp and Phinergy sign JV to produce metal-air batteries

Indian Oil Corporation (IOC) has entered into a joint venture agreement with Israel's battery startup – Phinergy, to produce aluminium-air (Al-Air) batteries, an alternative to costly and more popular lithium-ion batteries.

- The JV includes research and development, customization, manufacturing, assembly, sales and servicing of aluminium-air energy systems technology.

With emission norms getting stringent with the passing of every year, oil majors diversify or increase their focus on sustainable sources of energy. Players such as Shell, BPCL, Total and BP have already entered the battery sector.

Read this story

- Key figure -

Renault sold exactly **10,819** electric vehicles worldwide during January, more than twice as many as in the same month last year. Renault's Zoe alone reached **9,873** sales in the first month of the new year. In Europe, **14.4 %** of all Renault passenger car sales in January were electric.

10 February 2020

Glencore signs five-year cobalt supply deal with Samsung SDI

Glencore and Samsung SDI have signed a contract to supply Samsung with cobalt between 2021 to 2024. The contract covers an amount of 21,000 tonnes of cobalt from the Democratic Republic of Congo.

- 'The supply agreement demonstrates a continuation of Glencore's cobalt hydroxide marketing strategy to secure long-term supply agreements with key players in the lithium-ion battery supply chain. It also illustrates Glencore's role in supplying the materials that enable the energy and mobility transition and Glencore's commitment to responsible production.' - *Nico Paraskevas, Glencore copper and cobalt marketing head*

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04 February 2020

Hydro-Québec, Mercedes collaborate on solid-state battery development

Hydro-Québec is cooperating with Mercedes-Benz in the development of technologies for solid-state batteries. The aim is to test new materials under field conditions and thus accelerate battery development.

- Specifically, the research object is solid-state lithium metal batteries. As per Hydro-Québec, these batteries have a very high energy density, are durable and very light.

The joint research activities will be carried out at Hydro-Québec's center of excellence in transportation electrification and energy storage in Canada as well as the SCE France laboratory, a subsidiary of Hydro-Québec.

Read this story

17 February 2020

Researchers at UCL develop fast-charging, long-running and flexible supercapacitor

The new bendable graphene-based supercapacitor shows potential as a portable power supply in several practical applications including electric vehicles, phones, and wearable technology.

- Due to its porous graphene, the energy density of the supercapacitor was recorded at 88.1 Wh/L which is the highest ever reported energy density for carbon-based supercapacitors.
- Furthermore, it has comparable energy density to the state-of-the-art value of lead-acid batteries (50-90 Wh/L) and its power density is two orders of magnitude higher at over 10,000 W/L.

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NAWA TECHNOLOGIES

- Expert comment -

"The global ultracapacitor market is set to grow significantly in the coming years and thanks to the backing of new investors Bpifrance, Kouros SA and CAAP Creation as well as continued strong backing from our existing investors, NAWA Technologies is ideally positioned to take advantage of this increasing demand and propose innovative solution to integrate NAWACap cells in various applications."
Ulrik Grape, CEO of NAWA Technologies

24 February 2020

LG Chem to supply EV batteries to Lucid Motors

LUCID

LG Chem announced that it will exclusively supply electric vehicle batteries to U.S. electric carmaker Lucid Motors, which plans to start production of its Lucid Air sedan later this year.

- Lucid Motors said that it selected LG Chem for a long-term partnership because its batteries provide the ideal level of efficiency, with those batteries further optimized by Lucid to meet all target goals for range, energy density, and recharge/discharge rates.

LG Chem battery cells will exclusively power standard versions of this luxury EV through 2023.

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21 February 2020

Researchers develop a battery with new anode - doubles range and charges up to 80% in five minutes

KIST Korea Institute of Science and Technology

Researchers at the Korea Institute of Science and Technology (KIST) have developed a new silicon anode material that offers a great improvement on traditional batteries.

- The researchers proposed a low-cost and scalable approach for the production of high-performance silicon–carbon (Si-C) hybrid composite anode for high-energy Li-battery.
- The Silicon made by the research team is made of water, oil, and starch, all of which are available easily and at a very low cost. The composite materials (Si-C hybrid) developed from these ingredients demonstrated a capacity four-times greater than that of graphite anode materials (360mAh/g 1,530mAh/g) and stable capacity retention over 500 cycles.

Read this story

21 February 2020

NAWA Technology raises € 13M and moves to mass production

NAWA TECHNOLOGIES

Nawa Technologies, a French manufacturer of energy storage systems based on supercapacitors, has finalized a fundraising of €13M allowing it to enter the industrial phase of its new gen supercapacitors with the commissioning of its 1st production line at Rousset in 2020.

- At full capacity, the production tool will make it possible to reach a target of 100,000 cells per month. These first cells are intended for uses for electrical tools, small mobility and autonomous robots as well as for powering communicating sensors.

NAWA Technologies' Ultra Fast Carbon Battery can offer ten times more power and five times more energy than existing ultracapacitors.

Read this story

SPOTLIGHT

Battery Energy Storage

Fast-Charging, Long-Running, Flexible Supercapacitor developed by UCL

Expert comments

"Our new supercapacitor is extremely promising for next-generation energy storage technology as either a replacement for current battery technology, or for use alongside it, to provide the user with more power.

We designed materials which would give our supercapacitor a high power density – that is how fast it can charge or discharge – and a high energy density – which will determine how long it can run for. Normally, you can only have one of these characteristics but our supercapacitor provides both, which is a critical breakthrough" - *Zhuangnan Li, First author of the study, Department of Chemistry, University College London*

Read paper

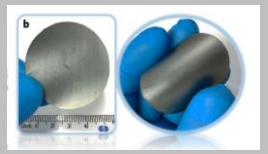
Features

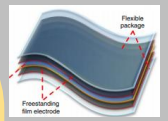
Supercapacitor can **bend to 180 degrees** without affecting performance and doesn't use a liquid electrolyte, which minimizes any risk of explosion

Supercapacitor has a comparable energy density to state-of-the-art value of lead-acid batteries, its power density is two orders of magnitude higher at over **10,000 Watt per litre**

Energy density of the supercapacitor was recorded as **88.1 Wh/L** (Watt-hour per litre), which is the highest ever reported energy density for carbon-based supercapacitors

University College London and **Chinese Academy of Sciences**





Driver for research

High-powered, fast-charging supercapacitors usually cannot hold a large amount of energy in a small space

Key findings

- The crucial step is found to be in tailoring the pores of the electrode material for a wide voltage window electrolyte. This is achieved by developing freestanding **graphene** laminate films with tunable interlayer spacing, which consequently enables the size of slit pores to be precisely adjusted.
- When pore sizes match the diameter of the electrolyte ions, the film reaches the most efficient pore utilization, and thereby exhibits a well-balanced porosity versus density, leading to an optimized volumetric capacitance.

FutureBridge

Are Batteries The New Oil?

FutureBridge analyst comment

With emission norms getting stringent with the passing of every year, oil majors diversify or increase their focus on sustainable sources of energy. Players such as Shell, BPCL, Total and BP have already entered the battery sector.

Among them, Total seems to be highly active as the Oil major has partnered with PSA and Tianneng Group for battery building and also has acquired a minority stake in Ionic materials to keep track of solid-state battery development.

Battery Energy Storage

Indian Oil Corp and Phinergy sign JV to produce metal-air batteries

Key takeaways

- The IOC and Phinergy will set up a join venture in India to manufacture Al-Air batteries and to facilitate research & development, customization, assembly, sell and service of aluminium-air energy systems technology.
- The joint venture will manufacture Al-Air batteries for electric vehicles and stationary applications and facilitate development of eco-system for Al-Air technology.

Other Oil majors entering battery sector

Bharat Petroleum

TOTAL

bp

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