

# Can NEO Battery Materials scale their breakthrough silicon anode material to allow 5-minute rapid EV charging?

Battery technology breakthroughs are happening quite often nowadays as companies focus to improve today's lithium-ion batteries. Key areas of improvement still needed are improving cost, energy density (range) and charging times. Today's company looks to have made a significant breakthrough in these areas by improving the anode part of the battery by using silicon nanoparticles uniformly coated by a highly elastic polymer. The silicon anode material provides improvements in capacity and efficiency over lithium-ion batteries using graphite in their anode materials.

The global lithium-ion battery anode materials size is forecast to roughly double in size from 2020 to 2027, rising to a value of US\$6.33 billion.

NEO Battery Materials Ltd. (TSXV: NBM) ("NEO") is a Canadian battery materials company with a current focus on developing silicon anode materials through an ion- and electronic-conductive polymer nanocoating technology.

Announced on June 7, 2021, NEO reported that they had achieved a 5-minute ultra-fast charging capability using their silicon anode technology. NEO's Chief Scientific Advisor and Director, Dr. Jong Hyeok Park, stated:

"NEO's nanocoated silicon anode allows for a safe full charge within 5 minutes, which demonstrates potential for scaling and implementation in larger cells such as those used in high

power EV batteries.”

Rapid fast charging an electric vehicle (EV) battery in only 5 minutes would bring EVs in line with conventional car refueling times at the gas station. If achieved at scale and in real world use, it will be a groundbreaking step forward for the EV industry. Judging by Dr. Park’s comment above it looks like he believes the technology has potential to scale successfully for EV use.

Traditionally the problem with silicon based anodes has been that the silicon swells and then damages the battery; however in this case NEO has developed a technology to prevent this. Dr. Jong Hyeok Park commented: “Our unique, proprietary solution integrates silicon nanoparticles uniformly coated by a nanometer-thick elastomer – a highly elastic polymer.”

**NEO Battery Materials is moving in the same direction as Tesla by developing better silicon materials for anodes**

## Tesla Battery Day & Silicon Anode Evolution

*A Shift Towards Integrating Silicon into the Anode*

*“We’re shifting the cell chemistry for the upgraded pack to partially use silicon in the anode ... We’re still primarily using synthetic graphite, but over time we’ll be using **increasing amounts of silicon** in the anode.” – **Elon Musk** (2015)*



*“What we’re proposing is a step-change in capability and a step-change in cost and to go to the **raw metallurgical silicon** itself” – **Drew Baglino**, SVP of Tesla Powertrain and Energy Engineering (2020)*

*“When we take that anode cost production, we’re looking at a **5% dollar-per-kilowatt reduction** at the battery pack level.”*

*“[Silicon] innovation alone could increase the range of Tesla vehicles by **20%**” – **Shieber & Korosec** (2020)*



Source: Company presentation

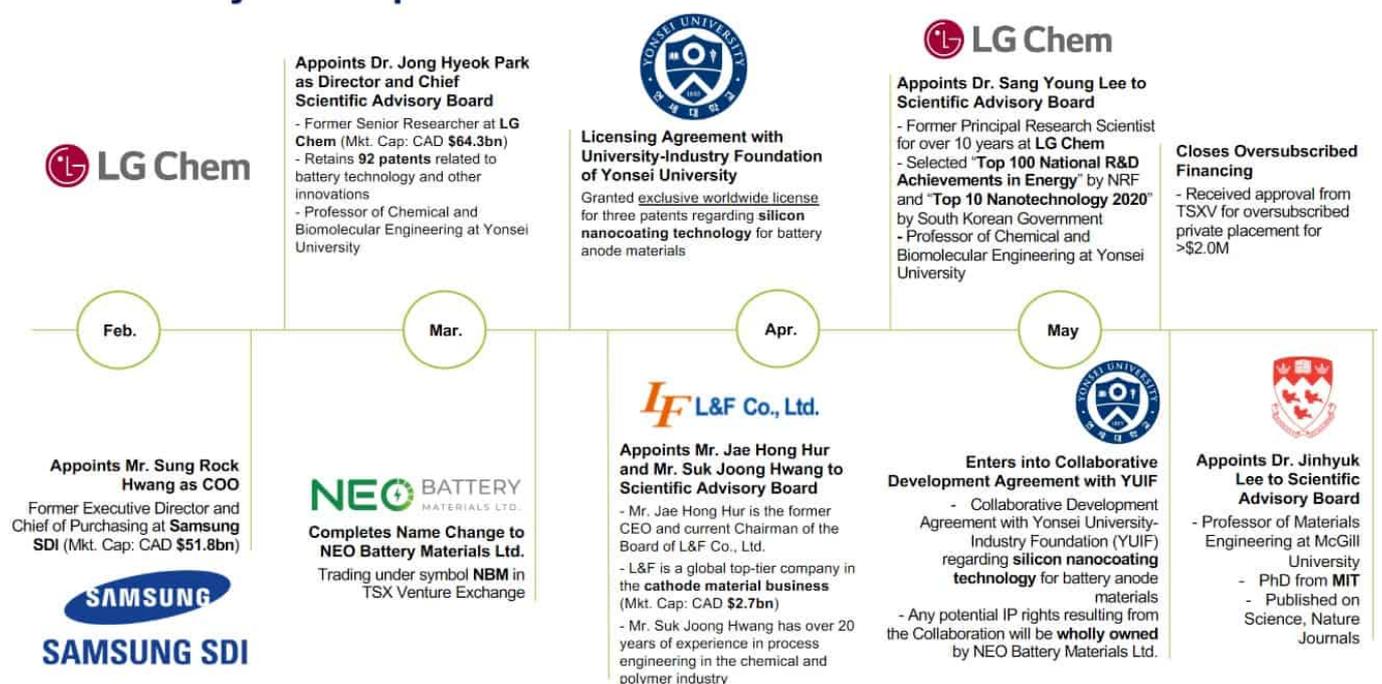
As a further step to achieve their goal of low cost, fast charging, durable silicon anodes, NEO has recently signed a

MOU with South Korean silicon powder manufacturer Korea Metal Silicon Co. (“KMS”). The news release stated:

“Under the terms of the MOU, NEO will closely engage with KMS to collaborate with the intent of pursuing solutions to remove the cost bottleneck associated with nanosilicon powders and to develop **manufacturing capabilities to mass produce low-cost nanosilicon powders** at a scalable and commercially viable level for NEO’s proprietary silicon anodes. The agreement would help accelerate NEO’s commercialization plans of its silicon anode technology.”

**NEO Battery Materials key development timeline includes appointing several expert advisers formerly from leading battery manufacturers Samsung SDI and LG Chem**

## Recent Key Developments in 2021



Source: Company presentation

## Next steps

NEO is currently developing a full cell prototype (with proprietary silicon anode material) with their team of top South Korean battery experts. The end goal is to produce at scale an innovative silicon anode material that is cost-

effective, mass-producible, and commercially viable.

### **Closing remarks**

NEO has excellent management and a top tier advisory board. This has resulted in a significant breakthrough with their silicon anode material that allows for ultra rapid (5 mins) battery charging by using silicon nanoparticles uniformly coated by a highly elastic polymer. As a next step, NEO and KMS plan to work towards scaling up low cost nano-silicon powders to be used for NEO's proprietary silicon anode material.

Judging by their success so far I would say NEO is looking like a good chance at success to ultimately scale their silicon anode material business to allow 5 minute rapid EV charging.

NEO Battery Materials trades on a market cap of C\$28 million. Exciting times ahead for this small top tier company.