

Nano One looks to be moving in the same direction as EV leader Tesla

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At Tesla Battery Day in September 2020 Tesla discussed how they plan to have a three prong approach to batteries – Lithium Iron Phosphate (LFP), **Nickel Manganese (NM or LMN)**, and high nickel (NCA or NMC). Today I look at the nickel manganese battery and a company that is moving in the same direction as Tesla. That company is [Nano One Materials Corp.](#) (TSXV: NN0) (“Nano One”).

Tesla’s planned mix of battery cathode types – Li Iron Phosphate (LFP), Nickel-Manganese (NM), high nickel (NCA) (NMC)



[Source](#)

Nano One specializes in improving battery cathodes. In particular the Company’s focus is to make low cost, high performance, cathode powders used in lithium ion batteries.

In October 2020, Nano One [announced](#) that they have developed a breakthrough in longevity for a cobalt free high voltage battery that has been successfully demonstrated at automotive rates of charge and discharge for over 900 cycles. The battery uses a low cost, cobalt-free **Lithium Nickel Manganese (LNM)** cathode active material made with Nano One’s proprietary One-Pot process.

The problem with removing the cobalt can be that the battery becomes less stable or has a lower lifespan (less cycles). However in this case Nano One has managed to achieve [900 cycles](#), which is heading towards the 1,500 cycles that a Tesla Model 3

achieves using a more expensive nickel-cobalt-aluminum (NCA) battery. The other reason for removing cobalt is that the world supply of cobalt is limited and mostly comes from the Democratic Republic of the Congo – A country rampant with issues such as corruption, child labor and exploitation. Many analysts are forecasting [severe cobalt supply shortages after 2023](#) just as the EV boom takes off. This explains why Tesla and Nano One are working towards a nickel-manganese battery with no cobalt.

Nano One's Chief Technology Officer Dr. Stephen Campbell [explains](#):

"We are able to avoid rapid capacity fade and premature failure and have successfully demonstrated a high voltage lithium ion battery cell with significant cycle life – this is an exceptional outcome. The enabling technology is Nano One's patented LNM cathode material operating up to 4.7 volts and made using our patented One Pot process. **The LNM voltage is 25% higher than commercial lithium ion batteries, improving efficiency, thermal management and power.**"

Nano One's Coated Single Nanocrystal Cathode gives a performance advantage



[Source](#)

In June 2020, Nano One [announced](#) the development of a coated, **single crystal cathode** material for lithium ion batteries that is providing **up to 4 times improvement in longevity**. The technology is applicable to all of Nano One's cathode materials.

Perhaps not surprisingly, Nano One was able to raise an oversubscribed equity raising of approximately [\\$14.37M](#) at an offering price of \$2.72 per Unit (one share and half a warrant).

The Company intends to use the net proceeds for research and development, capital equipment purchases and facility expansion, intellectual property acquisition, business development, working capital and general corporate purposes.

Nano One continues to have successful breakthroughs in improving lithium-ion battery cathodes, most importantly in all types of cathodes (iron based, nickel-manganese, and high nickel-cobalt). Combine this with their excellent established development partners Pulead (the global leader in LFP cathodes), Volkswagen (a leading OEM), and Saint-Gobain then it should not be surprising to see Nano One start to commercialize their patented technology in the near future.

The global cathode market is forecast to be a [US\\$23 billion](#) market by 2025 and includes a US\$1 billion potential licensing opportunity which Nano One is targeting. Nano One's goal is to achieve ~\$70M pa in revenues by 2025 at high profit margins.



Nano One's stock is up [118%](#) over the past year so early investors are certainly being rewarded. With the EV boom set to accelerate due to Tesla's planned [US\\$25,000 car by 2023](#), it should leave plenty of opportunity for Nano One to make their mark.

Avalon Advanced Materials

Separation Rapids Lithium Project progresses, EV investors look north for critical materials

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It is not very often that an investor can buy a company with exposure to both lithium and key magnetic rare earths. One company that offers exposure to both is [Avalon Advanced Materials Inc.](#) (TSX: AVL | OTCQB: AVLNF) ('Avalon'). Avalon has five critical materials projects across Canada, providing investors with exposure to **lithium, rare earths (neodymium, dysprosium)**, cesium, tantalum, feldspars, tin and indium.

With the electric vehicle (EV) boom set to take off, companies such as Tesla are planning to grow EV production by 50%pa reaching 20 million new EVs pa by 2030. At [Tesla Battery Day](#) Tesla suggested an aggressive industry wide target of 10TWh of Li-ion batteries pa by 2030 to meet EV demand (assumes a switch to 100% EVs).

Tesla says that's a 100 fold increase on 2019 levels. This suggests demand for EV metals (such as lithium and the magnetic rare earths) looks likely to surge this decade and create a super-cycle for the EV metal miners.

100% electric transportation requires 100x growth in EV battery production this decade



[Source](#): Tesla Battery Day video

Avalon's focus projects for lithium (Separation Rapids, Lilypad) and rare earths (Nechalacho)



[Source](#)

Avalon's Separation Rapids Lithium Project is located 70 km by road north of Kenora, Ontario, Canada. It holds one of the largest "complex-type" lithium-cesium-tantalum pegmatite deposits in the world. A [PEA](#) was completed in 2018 resulting in a pre-tax NPV8% of [\\$156m](#), post tax IRR of 22.7%, CapEx C\$77.7m with a 20 year mine life. In a [recent news](#) Avalon has been doing metallurgical test work with the overall objectives of reducing costs, improving recoveries and optimizing lithium product quality. Avalon has previously developed a proprietary process flowsheet to produce a high purity lithium hydroxide product from petalite. The process limits waste by recycling of the sulphuric acid solvent. Avalon and partners are now optimizing the final stages of the process, which involves the use of electrolysis to produce lithium hydroxide. The results will enable finalizing equipment selection and design. A further 2,500 tonne bulk sample extraction program is set to commence next. With Ontario Premier Doug Ford [recently announcing](#) Ontario's interest in establishing new battery materials supply chains in the province, Avalon is investigating collaborative opportunities to establish a lithium processing facility in Northwestern Ontario.

Avalon's Lilypad Cesium Property, located 150 km northeast of Pickle Lake, Ontario, is an exploration stage project with cesium-lithium-tantalum mineralization. It has the potential to be a secondary lithium supply source for Avalon. Avalon has [recently re-activated the Project](#) due to increasing demand for cesium. Planned follow-up work will initially involve

mineralogical and analytical testwork, which will be followed by metallurgical process testwork to identify the most efficient methods for concentrating the pollucite ore and recovering by-product tantalum and lithium.

Avalon's flagship Nechalacho Rare Earth Elements Property is located at Thor Lake, Northwest Territories, Canada. Avalon's main focus is the deeper HREE Basal Zone at the property. The Basal Zone retained by Avalon contains a rich polymetallic rare metals resource, with potential for economic recovery of several rare earth elements. A [Feasibility Study](#) was completed in 2013 on the Basal Zone resulting in a pre-tax NPV10% of \$1.35 billion (post-tax NPV10% of \$900m). The post-tax IRR was 19.6%. CapEx was \$1.575b. Sales of the five critical REO (neodymium, europium, terbium, dysprosium and yttrium) account for over 82% of the separated REO revenues. Avalon has also retained a 3% NSR on the near surface T-Zone and Tardiff Zone at the Nechalacho Rare Earth Elements Property, [bought by](#) Cheetah Resources back in 2019. Avalon could also potentially collaborate with the newly planned SRC Rare Earths Processing Facility to be established in Saskatchewan with plans to be operational by late 2022.

EVs are coming in all shapes and sizes and they will require huge amounts of EV metals such as lithium and rare earths

Avalon Advanced Materials Inc. stock is [up 87.5%](#) over the past year and trades on a market cap of C\$26m.