



SCAN Here to See How It Works

Cathode Process Comparison

STEPS Combined
pCAM + CAM + Coating

Our One-Pot Process

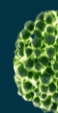
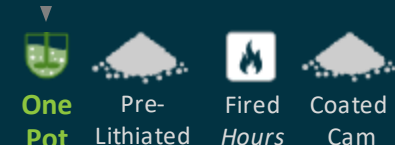
Mining & Refining

Sulfate Free Inputs



Lithium + Metals + Coatings

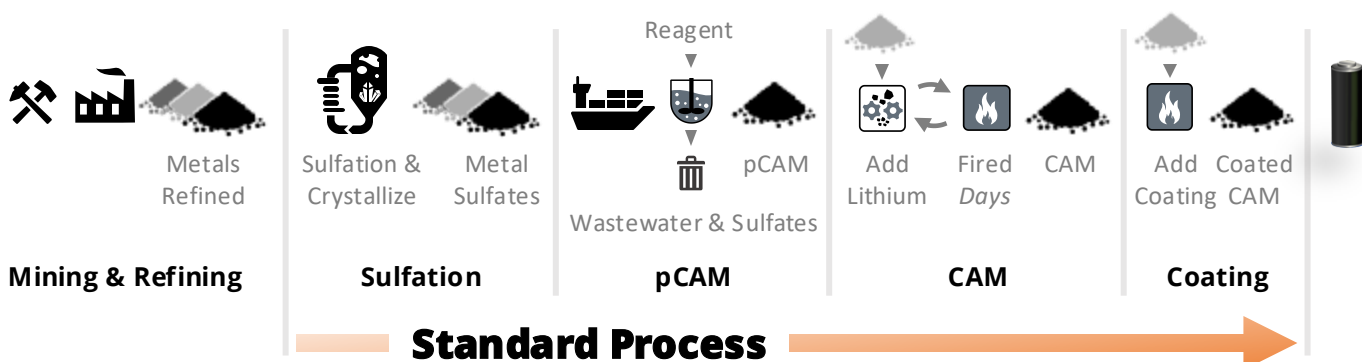
Reagent



Nano One's Coated Single Crystal CAM

Protective coatings are formed simultaneously with the underlying single crystals, eliminating costly production steps, reducing ruptures and enhancing durability.

- +** **Cost-Competitive¹** ↓ Steps, Equip, Time, Energy, Water, Waste, ↑ Yield
- +** **Greener²** ↓ 50% - 60% Less GHGs ↓ 80% Less Water
- +** **Cleaner** ∅ Wastewater ∅ Sulfate By-Product
- +** **Diversified Supply Chains** ∅ Foreign Supply Chains Of Concern



- !** **Costly¹** ↑ \$, Steps, Time ↓ Yield
- !** **Wasteful²** 2x GHGs, 5x More Water 1-5x More Wastewater & Sulfate
- !** **Dependent** On Foreign Supply Chains Of Concern



Conventional Coated Polycrystalline CAM

Protective coatings are formed around clusters of crystalline particles, with additional steps, and are prone to rupture when recharged, exposing underlying crystals to damaging side reactions.

¹ Independent Pre-Feasibility Study - <https://nanoone.ca/news/pre-feasibility-study-anticipates-10x-increase-in-capacity-for-nano-one-lfp-site-in-quebec/>
² Independent Life-Cycle Analysis - <https://nanoone.ca/news/nano-one-could-reduce-ghgs-by-up-to-60-for-nmc-50-for-lfp-and-reduce-water-use-by-up-to-80/>

Cathode Production Comparison



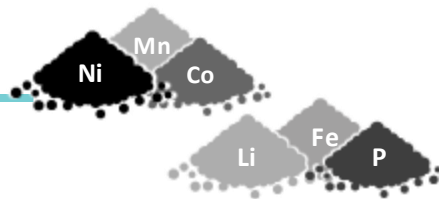
MINE

Raw critical minerals are mined.



REFINE

Minerals are refined & purified for use in batteries.



Battery grade metals and inputs.

STEPS

Our Process

Standard Process



pCAM

Precursor Cathode Active Materials

Sulfate-Free Inputs

Our M2CAM® process enabled Metals to be transformed directly into Cathode Active Material eliminating many costly and wasteful steps.

Metal-Sulfate Inputs

Requires intermediate chemical transformations that add cost, energy, GHGs and harmful by-products.



Dissolve into Sulfates

Metals are chemically transformed into metal sulfates in preparation for PCAM process.

Eliminate Steps



Crystallize/ Co-Locate

Crystallize into powders (5-10x heavier) and ship to PCAM producer. Or co-locate with PCAM to avoid crystallization (limited options and flexibility).

Less water, logistics, capital cost, energy, GHGs, and waste.



Process into PCAM

Dissolve into PCAM powders, leaving sulfate in solution (1-5x the product stream) with trace metals and water.

Helps diversify supply chains, simplify permitting and enable localization.



















Treat Wastewater & Dispose Sulfates




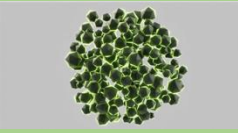
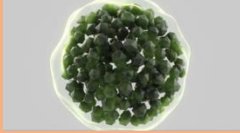
Uses energy and generates large volumes of sulfate, some repurposed, but mostly discharged into waterways where permitting allows.



Cathode Production Comparison

STEPS	Our Process	Standard Process
 <p>CAM Cathode Active Materials</p>	<p>Streamlined One-Pot Process</p> <p>Central to our cathode manufacturing solutions, the One-Pot process simplifies production and enables our M2CAM® technology.</p> <p>Our production methods require less water and consume less energy, reducing operational cost and time while using sustainable, scalable design.</p>	<p>Energy-Intensive Inefficient Process</p> <p>The lithiation firing step is long, spanning from hours to days, and energy-intensive.</p> <p>Large, inefficient kilns are used to complete this step which drives up capital and operating expenditures, while presenting scaling challenges.</p>
 <p>Add Lithium Lithium is added to the other battery metals.</p>		
 <p>Process Lithium mixed metal powder is ground, milled and magnetically separated for contaminants.</p>	<p>Eliminate Milling Intermediate material is already lithiated.</p>	
 <p>Dry Lithium mixed metal powder is filtered or spray dried.</p>		
 <p>Fire in a Kiln Lithium mixed metal powder is thermally processed at high temperature.</p>		
 <p>Grind / Mill (Again) Mill chunky output into powder.</p>	<p>Eliminate Steps</p>	
 <p>Fire (Again) Thermally process again.</p>	<p>Fully lithiated intermediate fires readily without requiring milling and re-firing.</p>	

NMC Cathode Production Comparison

STEPS	Our Process	Standard Process
 <p>Coated CAM Coated Cathode Active Materials</p>	<p>Coated Single Crystal</p> <p>Protective coating forms between crystals at same time as CAM, eliminating extra steps needed for coatings.</p>	<p>Coating Adds Steps and Cost</p> <p>Coatings for NMC are added after the CAM is formed requiring extra steps, cost and energy.</p>
 <p>Add Coating</p>		
 <p>Dry</p>	<p>Eliminate Coating Steps</p> <p>Less water, energy & operational costs.</p>	
 <p>Fire</p>		
	<p>Sustainable, Efficient, and Cost-Effective CAM</p>  <p>Nano One's Coated Single Nanocrystal Cathode Nanocrystals, individually coated and formed in a single step, exhibit enhanced durability by resisting fracture.</p>	<p>Standard CAM</p>  <p>Conventional Polycrystalline Cathode Particles Protective coatings are formed with additional steps, but repeated charge cycles damage the coating, exposing individual crystals to side reactions.</p>