At the CORE of Umicore's
Battery Materials

Short to mid-term battery trends: Umicore's CAM portfolio covering full spectrum of EV segments

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materials for a better life

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SVP Global R&D

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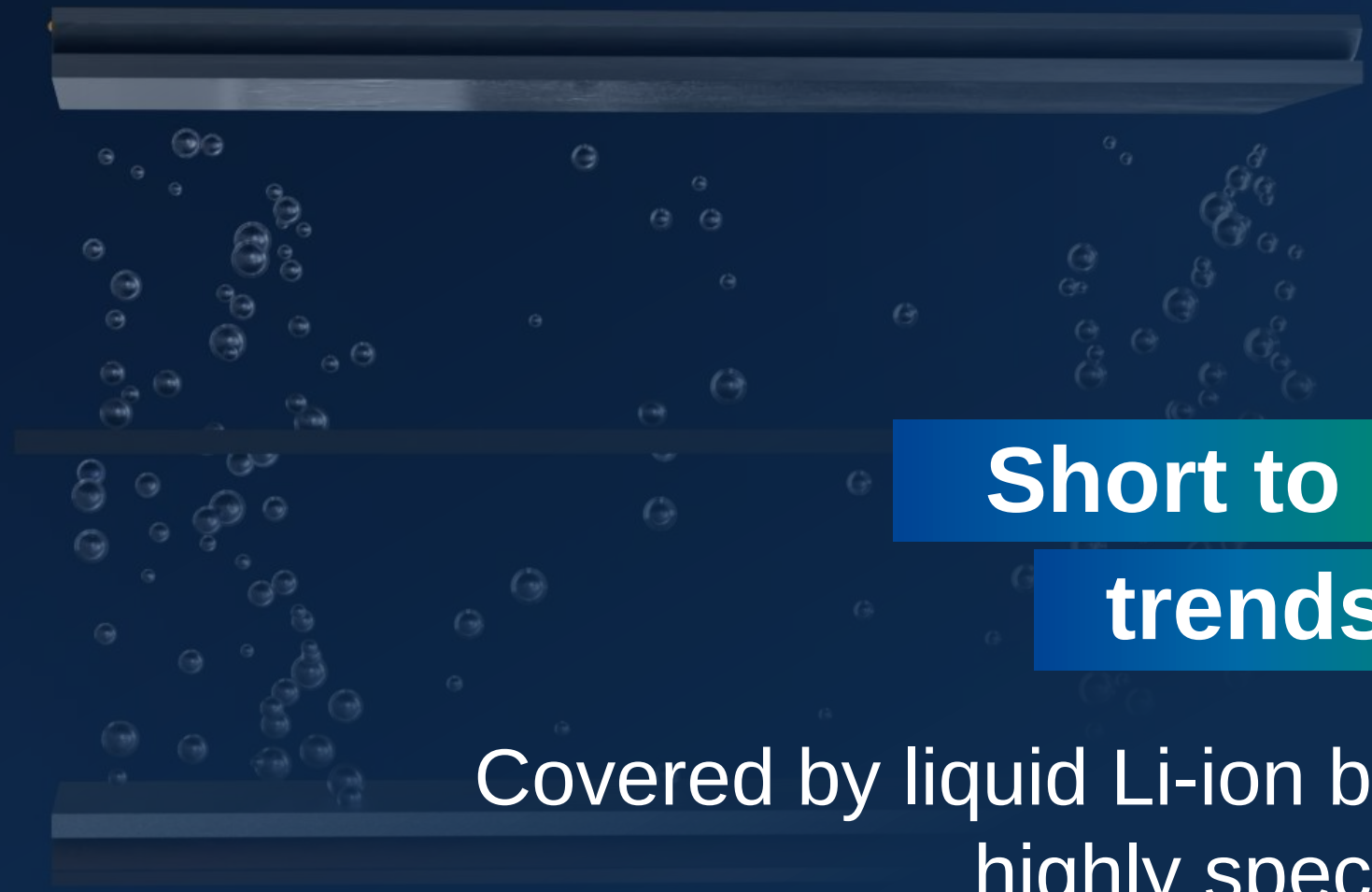
Key take-aways



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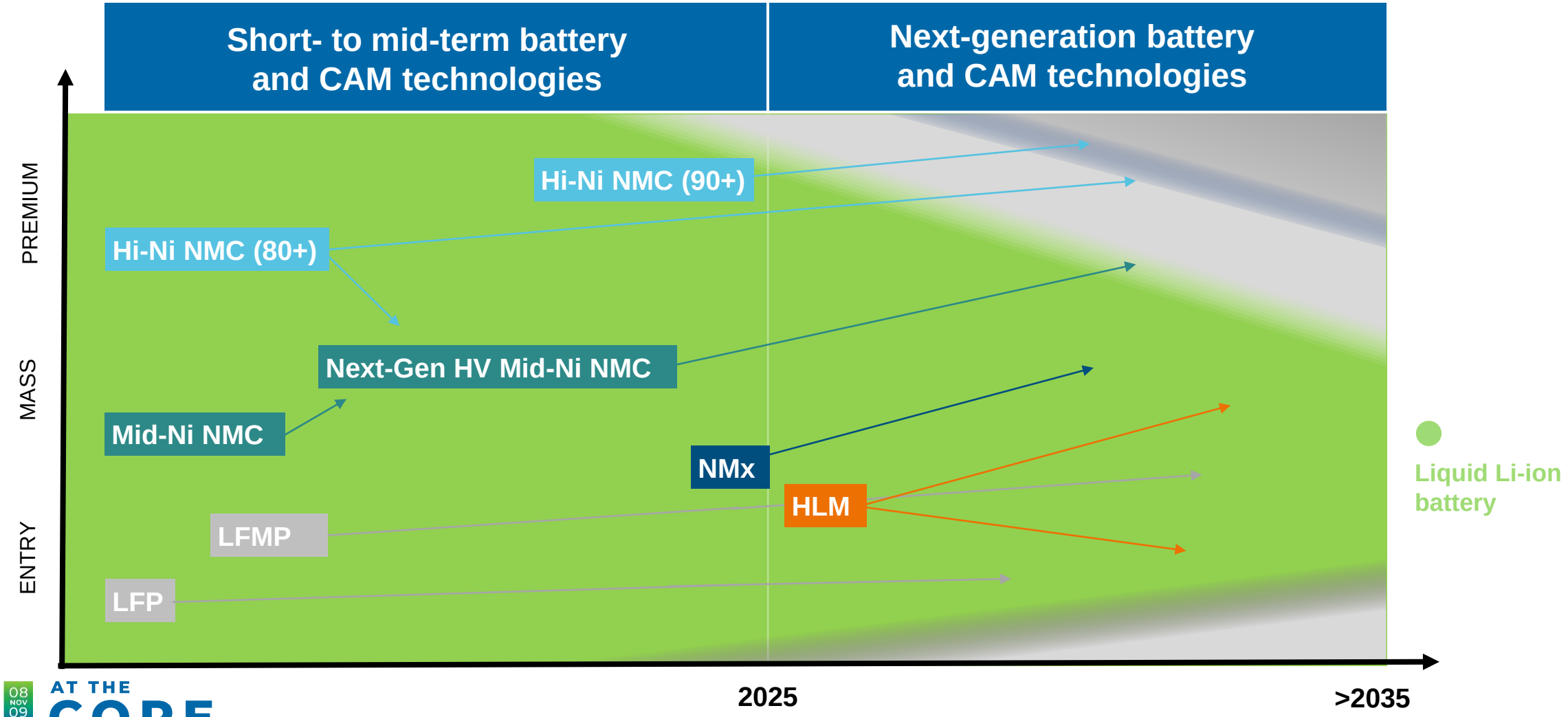
Short to mid-term trends for EVs:

Covered by liquid Li-ion batteries with highly specialized CAM

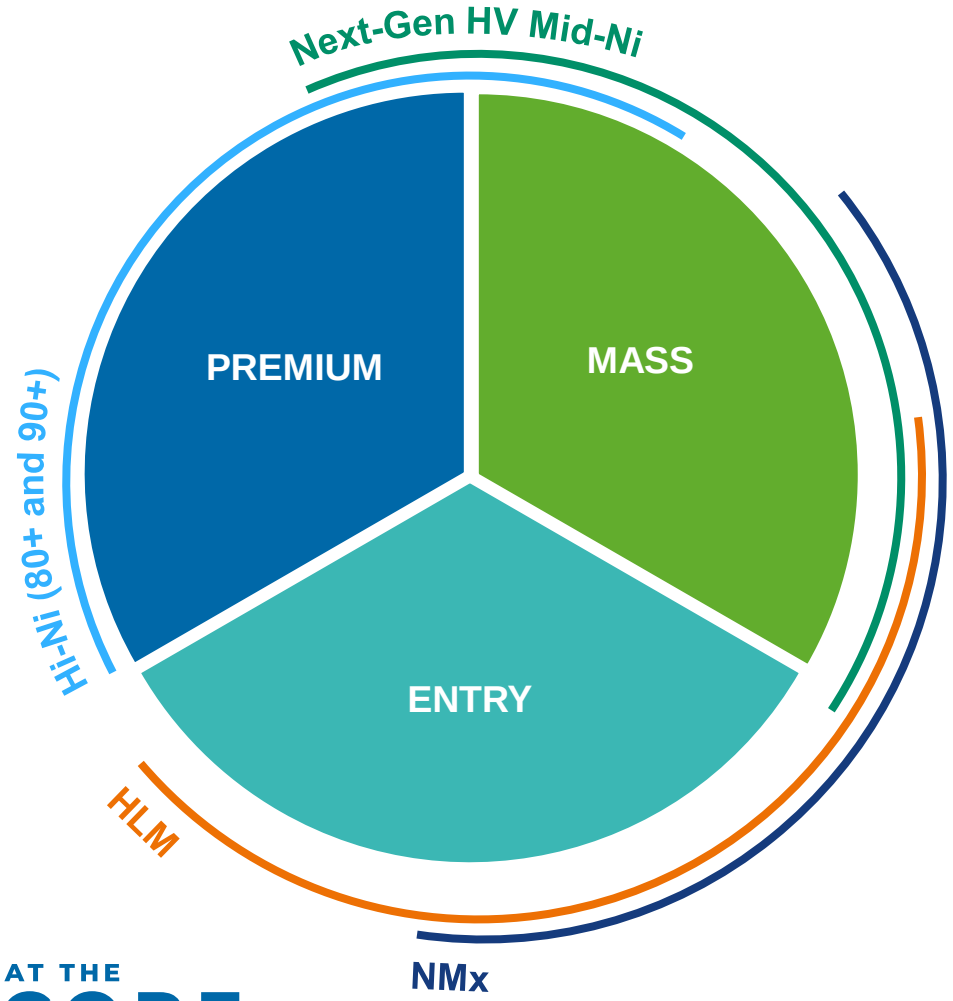
Short to mid-term trends for EVs

Covered by liquid Li-ion batteries with highly specialized CAM



Short to mid-term trends for EVs

Umicore’s NMC CAM portfolio covering all EV segments



- Umicore’s CAM portfolio for Li-ion batteries spans **ALL** short to mid-term performance needs of entry, mass and premium EVs
- LFP chemistry not in Umicore portfolio: **Next-gen HV Mid-Ni, HLM and NMx to cater for entry and mass segments**

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Umicore's Hi-Ni NMC:

Industry-leading and further pushing technology boundaries for premium and mass EVs

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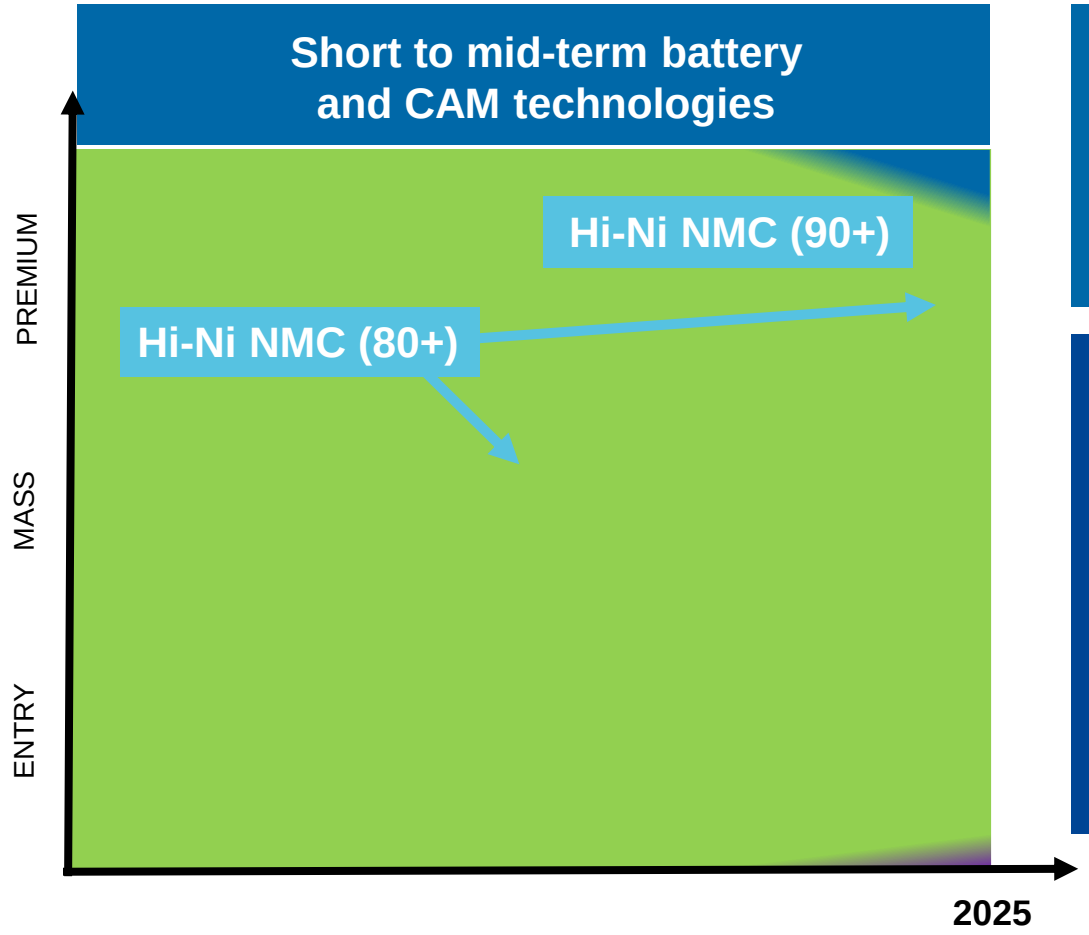
Short to mid-term trends for premium & mass EVs

Hi-Ni for longer range, less weight and smaller dimensions

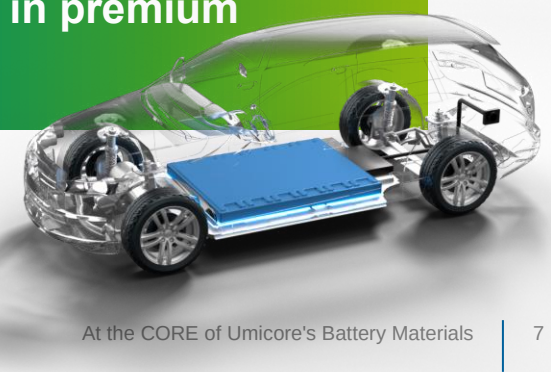


Boosting CAM nickel content to very high values (90+)

Allows to push energy density, but can result in safety issues

Umicore's monolithic Hi-Ni NMC is industry-leading in combining energy density performance and safety

Umicore's 80+ NMC in premium and mass EVs today; Umicore's 90+ NMC in premium EVs with SOP as of 2026



Hi-Ni NMC

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Umicore’s Hi-Ni NMC

Hi-Ni NMC already representing substantial portion of Umicore order book

Several long-term supply agreements for Hi-Ni NMC CAM

With several battery OEMs: AESC, ACC, PowerCo*, Chinese battery OEM

**Supplied through IONWAY*

For premium and mass-market EVs in North-America, Europe and Asia

Hi-Ni NMC

Vast majority

of 2027 order book relates to Hi-Ni NMC (80+ and 90+)

AESC

ACC AUTOMOTIVE CELLS Co

PowerCo

Chinese cell OEM

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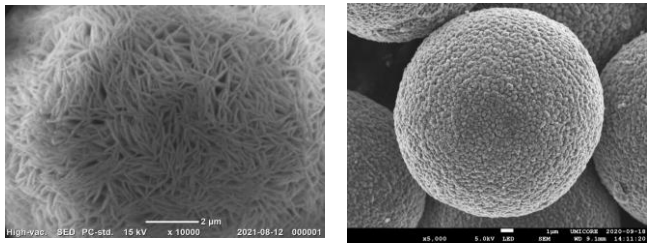
Umicore’s Hi-Ni NMC

Technology capabilities spanning both poly and mono-morphologies

Poly-crystalline Hi-Ni CAM

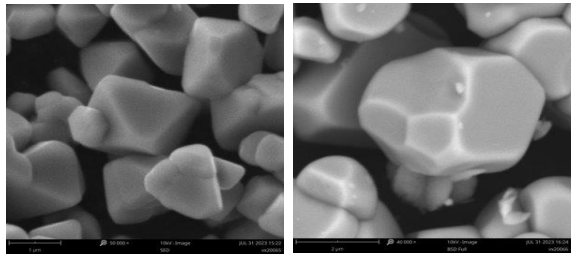
- Outstanding energy density
- Traditional industry practice to increase Hi-Ni NMC performance
- **Continued technological developments** to further optimize CAM performance



Umicore among the industry leaders

Mono-crystalline Hi-Ni CAM

- Better fracture resistance while maintaining **strong energy density performance, cycleability and safety**
- Umicore **proprietary development**: 98 patents in portfolio covering mono-structure
- **Majority of Umicore’s Hi-Ni customers** prefer mono-structure over poly – key differentiator for Umicore



Umicore is the leader in mono-crystalline CAM

Hi-Ni NMC

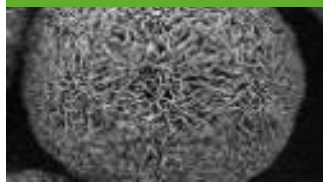
Umicore’s Hi-Ni NMC

Umicore’s upstream integration unlocking next level CAM performance

Micro-engineered precursors
requiring advanced technical skills

Industry-leading CAM performance for both poly- and mono-structures

Hi-Ni POLY



Good sphericity precursor development

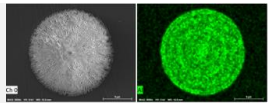
- Narrow span, coarse spherical particles
- Micro-engineered structures

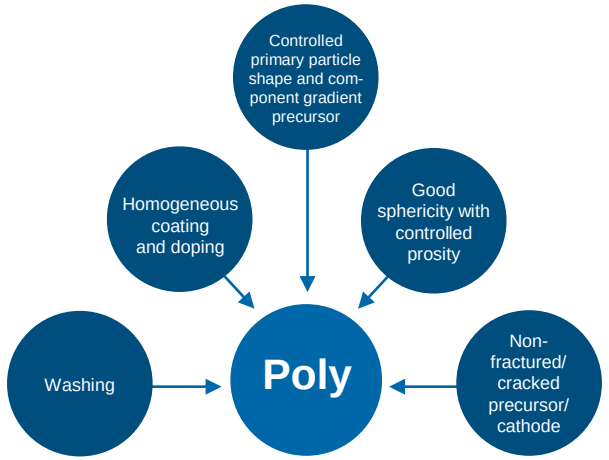
Hi-Ni MONO

Monolithic precursor precipitation

- Fine particle-size precursors
- Micro-engineered structures
- Efficient post process for fine particles

\+ **advanced precursor doping for both mono and poly**





Through optimized material design & process development, Umicore achieves leading CAM for cost, safety and energy density

Hi-Ni NMC

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Umicore's next-gen HV Mid-Ni NMC:

Increasing CAM voltage capabilities to unlock higher energy density for mass EVs

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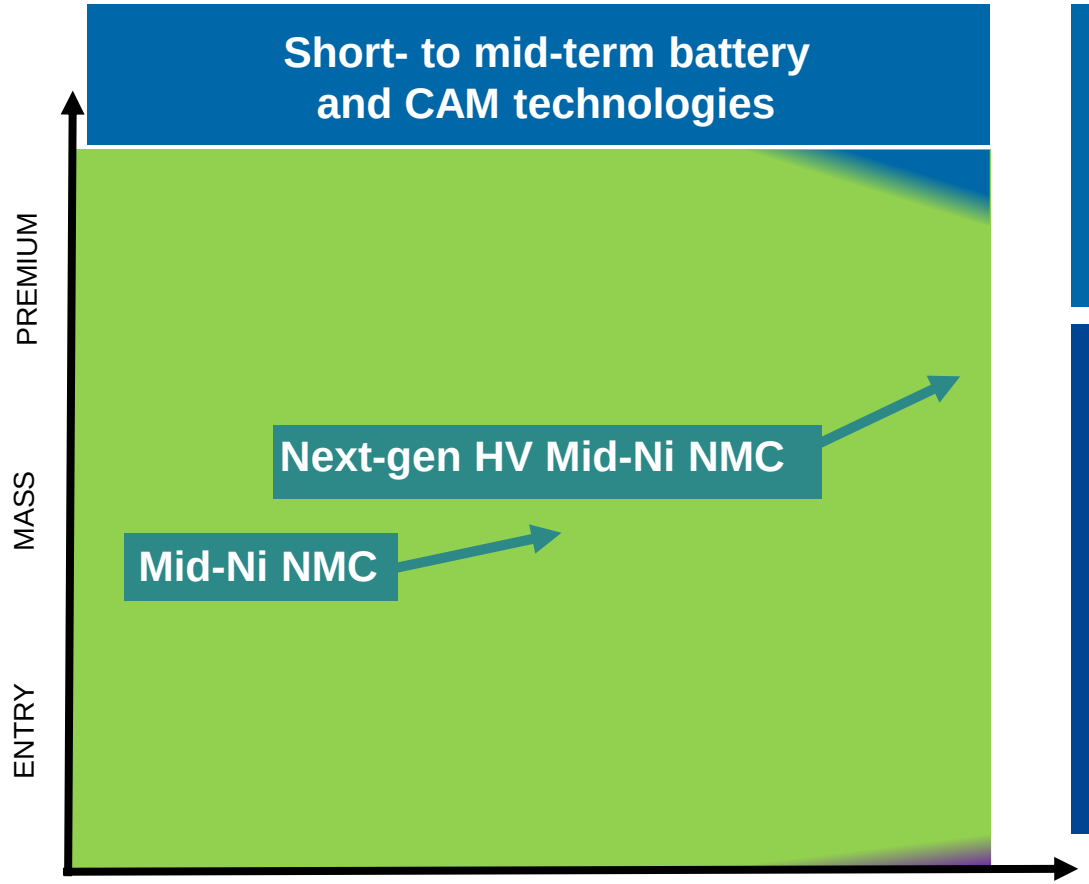
Short- to mid-term trends for mass EVs

Increasing Mid-Ni CAM voltage to unlock higher energy density



Mid-Ni high voltage as next-generation technology route developed by Umicore

Allows to upgrade energy density, but high voltage can result in stability issues for the CAM

Umicore's next-gen HV Mid-Ni NMC provides pCAM and CAM cycle and voltage stability when charged up to 4.46V

Mass market introduction as of 2027

Next-Gen HV Mid-Ni NMC

Umicore’s next-gen HV Mid-Ni NMC

Proprietary research unlocking higher voltage without CAM cycle issues

Umicore’s proprietary Mid-Ni NMC features:

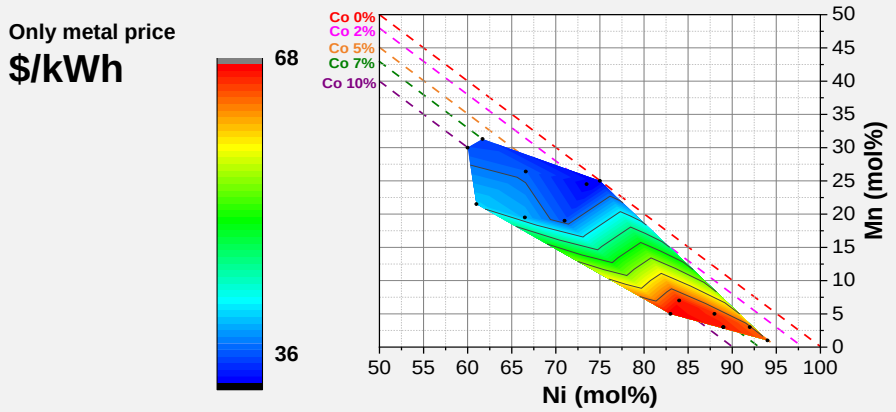
- Surface coating (secondary particle)
- Specific coating + doping (primary particle)
- Reshaping (primary particle)
- Blending with single crystal

Doped and modified CAM composition resulting in improved cycle stability and especially high voltage stability, when charged to 4.46 V

Broad Umicore patent portfolio on post- and pre-treatments for high-voltage applications

Demonstrated performance upon industrialization:

- **Cost benefits** from lower Ni and Co
- **Competitive energy density** vs Hi-Ni at 4.46V
- **Safety:** higher thermal stability vs Hi-Ni
- **Higher volumetric and gravimetric density** vs L(M)FP



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Umicore's high lithium, manganese HLM:

Superior range – cost proposition for future entry and mass EVs

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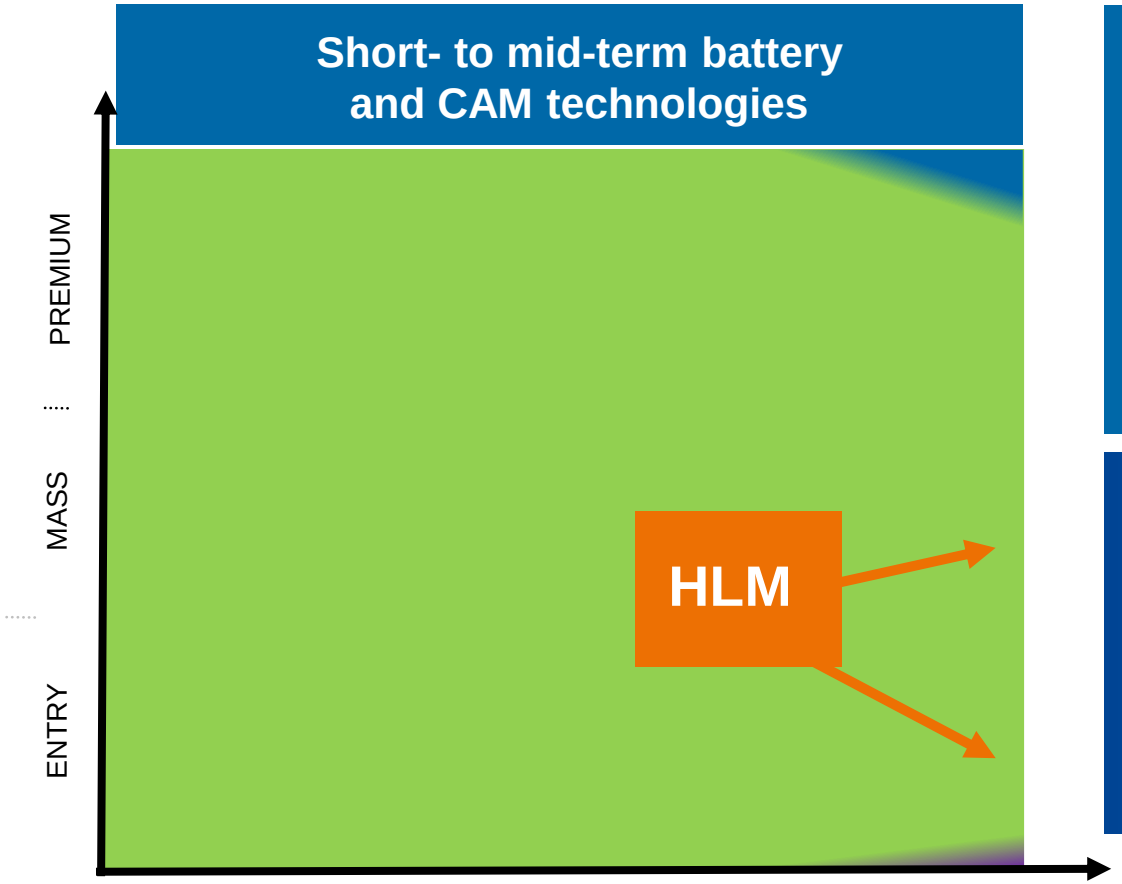
Short- to mid-term trends for entry and mass EVs

Superior range - cost proposition for future entry and mass EVs with HLM



High lithium, manganese HLM allows:

- Cost decrease due to lower raw material use (low-Ni, low-/zero Co)
- Energy density still substantially beyond capabilities of LFP

Difficult to produce mass-scale due to conductivity and stability issues

Umicore as first player to demonstrate mass-production capabilities of HLM

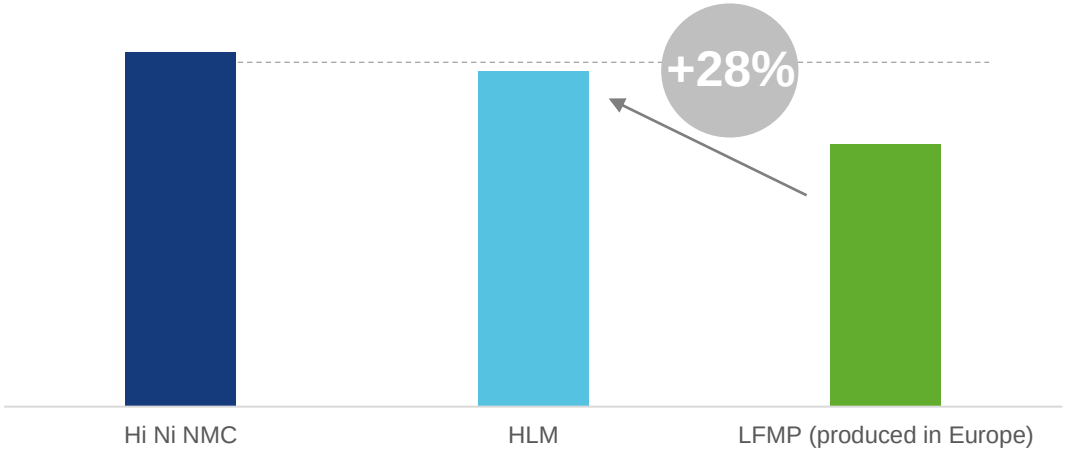
Market introduction as of 2026 in Europe and North-America

High lithium, manganese HLM

High lithium, manganese HLM

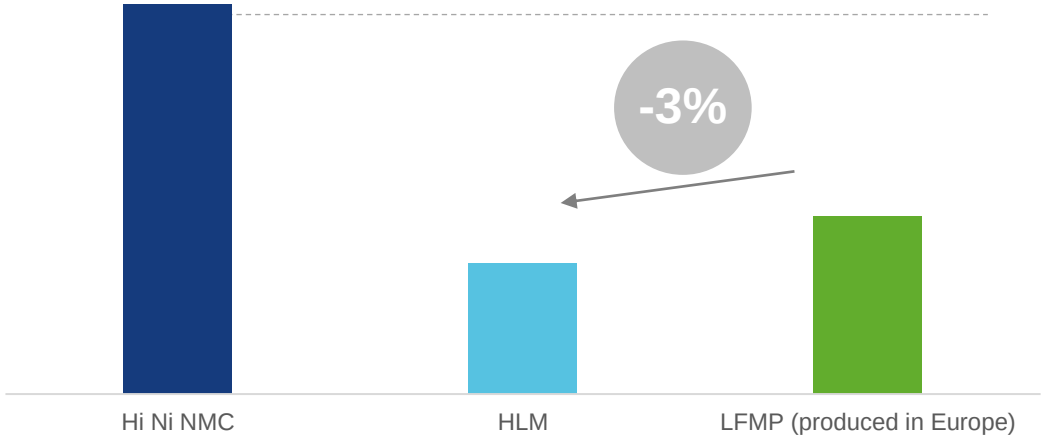
Competitive $/kWh trade-off versus LFP outside China in 2027

Relative gravimetric energy density performance of HLM and LFMP indexed versus Hi-Ni NMC at cell level (Wh/kg)



HLM energy density close to Hi-Ni and well above LF(M)P produced in Europe

Relative cost of HLM and LFMP indexed versus Hi-Ni NMC at cell level (USD/kWh)*



Competitive cell cost vs LF(M)P produced in Europe with higher remained value at EoL

Umicore's HLM paves the road for continuous $/kWh improvement without impacting freedom of design and driving range

*Total cell price $/kWh based on 2027 metal prices – based on internal and external research)

High lithium, manganese HLM

Strong technology proposition for entry and mass EVs in Europe and North America

HLM is the better value proposition versus LF(M)P…

Higher energy density

Better performance in cold temperatures

Produced on **existing NMC** production lines

Cost **competitive**

Better sustainability performance (lower CO_2 generation)

Higher value of recycling at end of life

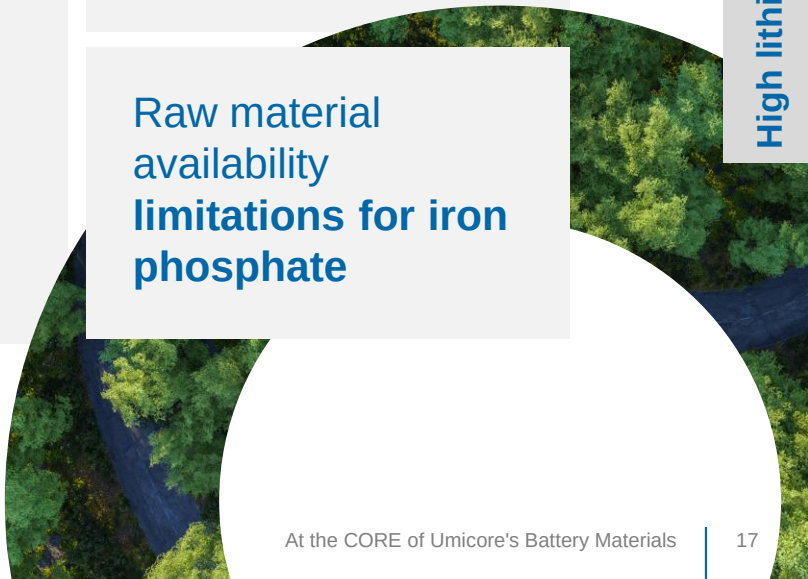
… in particular for Europe and North-America

LF(M)P cost hard to replicate elsewhere due to subsidies in China and massive inventory of iron phosphate

LF(M)P requiring greenfield investments in Europe and N-A

Recycling of LF(M)P **not economical**

Raw material availability **limitations for iron phosphate**



High lithium, manganese HLM

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High Lithium Manganese

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High lithium, manganese HLM

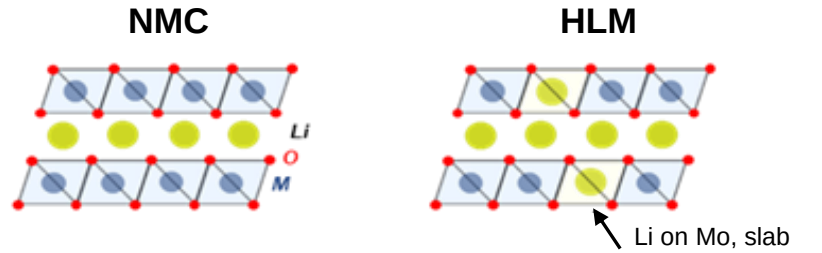
The characteristics

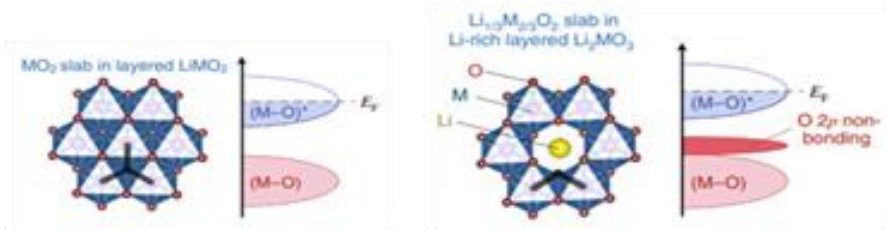
HLM = NMC with Li and Mn boost and reduced Ni and Co content

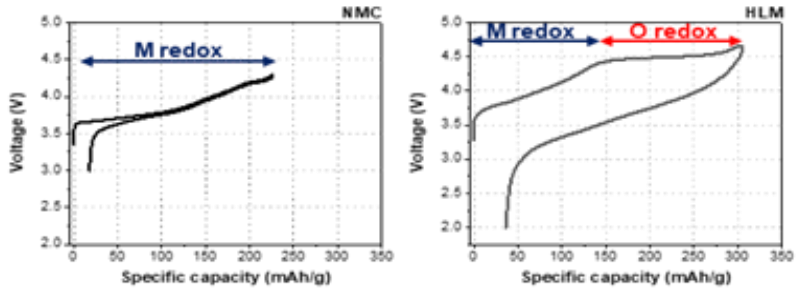
Raw material cost benefits and high energy density result in attractive $/kWh profile

However, conductivity and stability issues hampered industrialization

Umicore has extensive R&D activities in HLM since 2015 with > 140 patents and recently announced successful industrialization capabilities







Assat, G. & Tarasoon, J.M. et al. Nat. Energy, (2018)

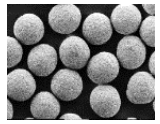
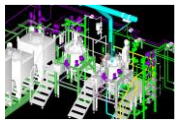
High lithium, manganese HLM

Umicore as first company to demonstrate mass-scale capabilities of HLM

Micro-engineered pCAM and CAM

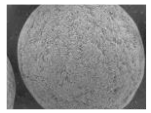
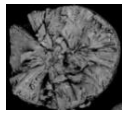
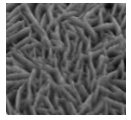
Pioneer in precipitation technologies

- Precipitation laboratories
- Pilot plant
- Modeling
- Porosity, Pore dist. and pore size


Next-level material technologies

- Li2Co3 source for lithiation
- Functional crystal structure & chemistry
- Micro-engineering with coating and infusion
- Electrolyte conformity and activation mechanism
- Advanced analytics and characterization

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With controlled crystal orientation and micro-engineering capability (tailored morphology and physical properties), Umicore achieves long stable cycle & optimized gassing

High lithium, manganese HLM

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The attractive potential

of zero-cobalt NMx

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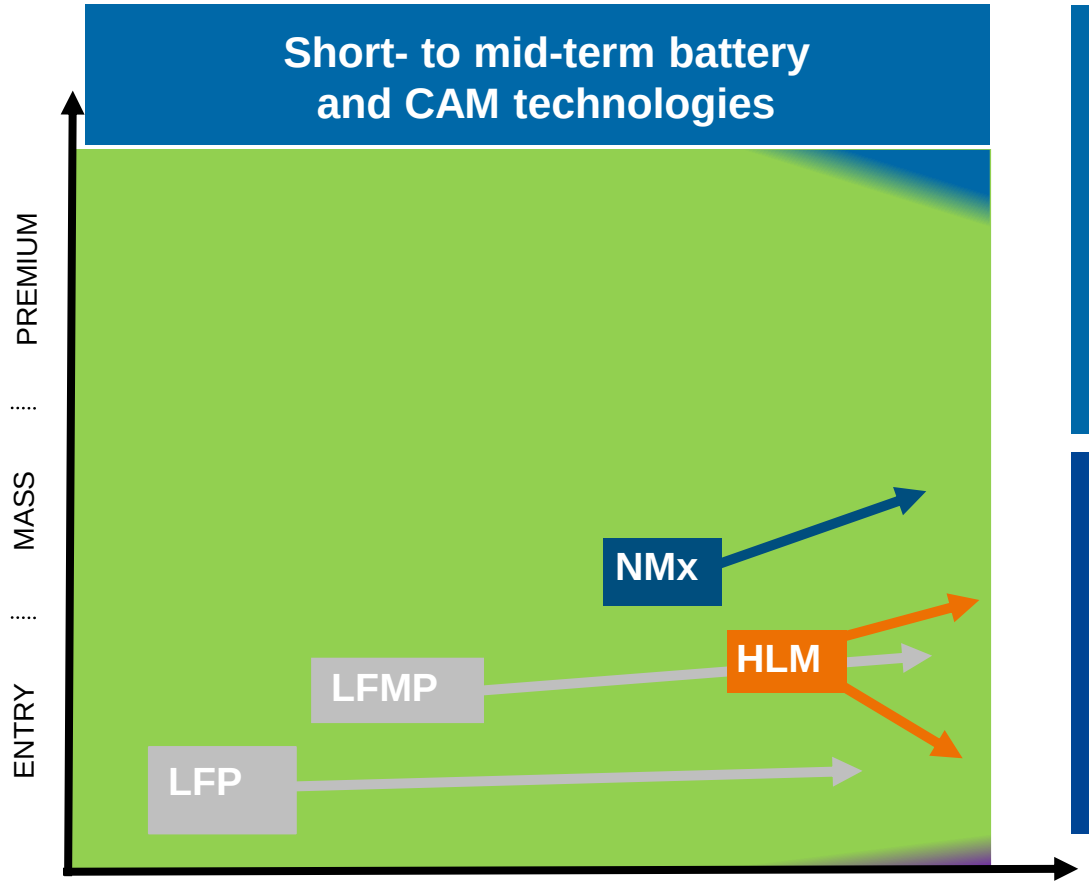
Zero-cobalt NMx

The strong case of low cost NMx for the mass EV segment



Cobalt-free NMx developed to avoid dependency on cobalt supply chain

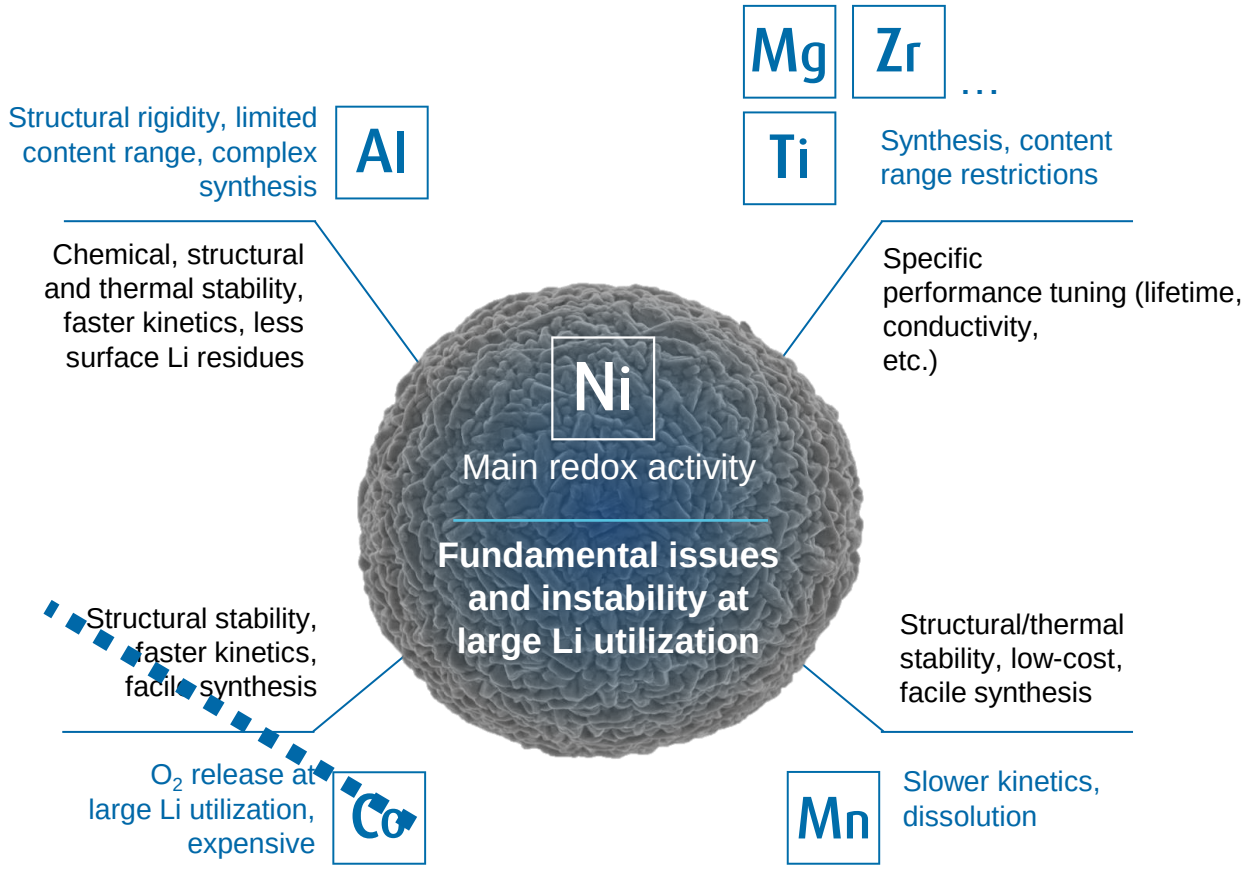
Challenge to design cobalt fully out of NMC structure due to stability and performance characteristics

Umicore NMx as lower cost technology for mass market vehicles

Market introduction as of 2025/2026

Zero-cobalt NMx

The strong case of low cost NMX for the entry EV segment



NMx CAM technology offers following benefits:

- Lower raw material dependency (low-Ni, zero Cobalt) vs Hi-Ni
- Comparable $/kWh and > energy density vs LF(M)P
- Lower CO_2 footprint

Umicore's specialized NMx process:

- Enhanced precursor & doping technology
- Homogeneous coating with specialized washing process
- Improved surface treatment

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Key take-aways

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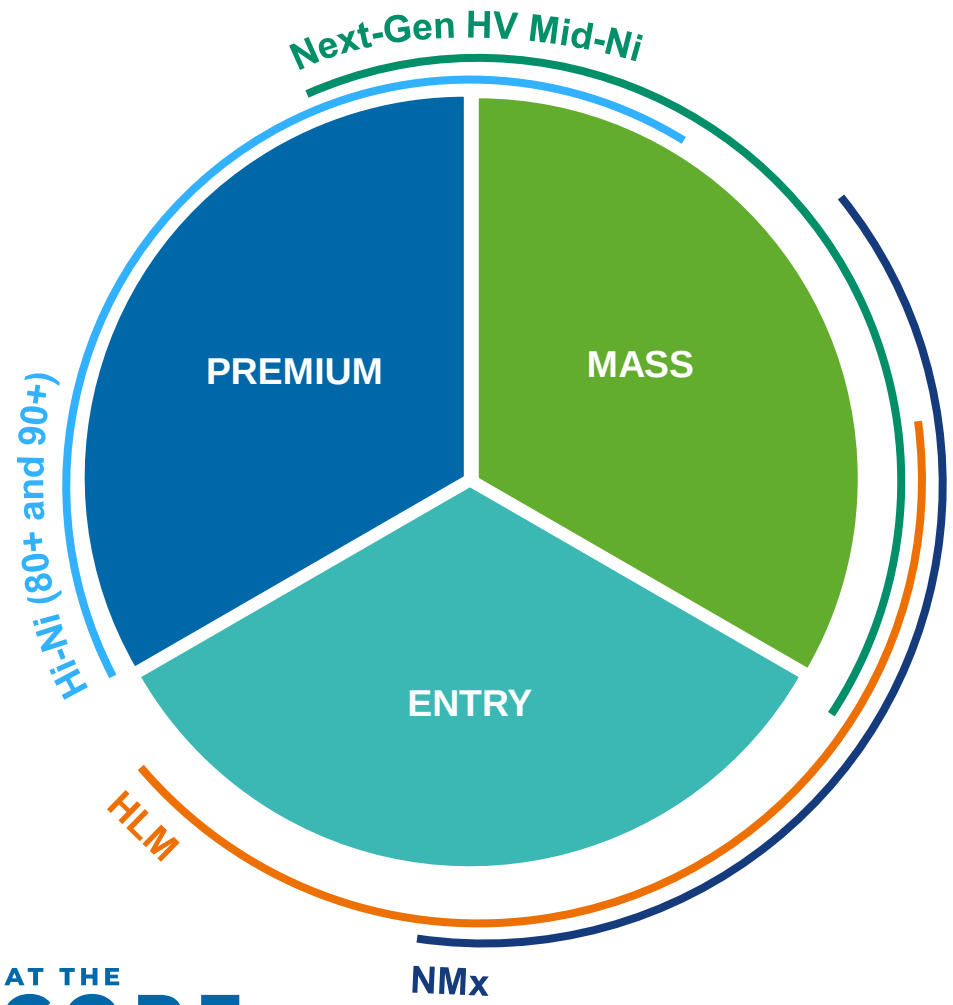
Key take-aways



Umicore's CAM portfolio covers all short- to mid-term needs for entry, mass and premium EV segments:

- Diverse customer needs covered with broad, yet targeted CAM portfolio
- Strong track record: substantial Hi-Ni contracts in current order book and next-gen HV Mid-Ni in qualifications
- Persistent technological advances: optimizing very Hi-Ni Poly and Mono for premium and mass, focus on HLM & NMx market introduction for mass and entry segments
- Full validity of Umicore's production lines ensured across chemistries
- Currently > 35 active joint customer projects to bring new chemistries to the market

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