

IBUvolt® NMO

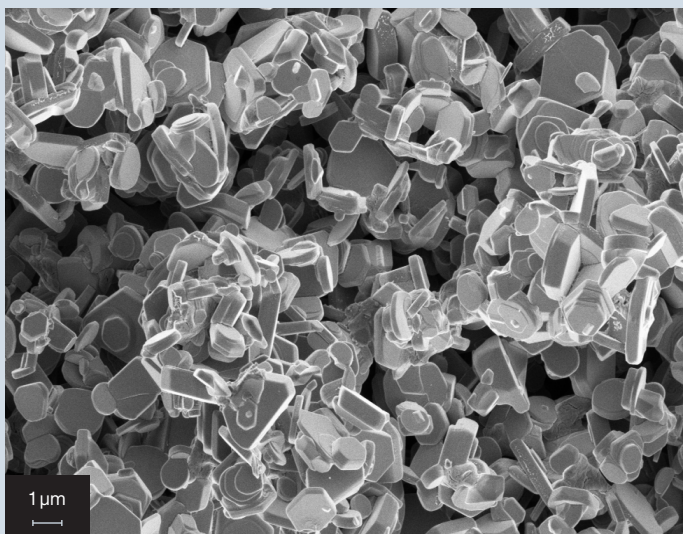
We Produce NMO in Germany
to the Highest Standards.

Tailor Made NMO Development.



10 YEARS
OF EXPERIENCE IN
BATTERY MATERIALS





NMO

Commercial source for sodium manganese oxide
Production capacity at ton scale.

Abundant precursors
No heavy metals or critical raw materials.

Economic process
IBU-tec's technology allows lower process times and temperatures.

Scalable, continuous production
Efficient synthesis with less by- and waste products.

CHEMICAL & PHYSICAL PROPERTIES

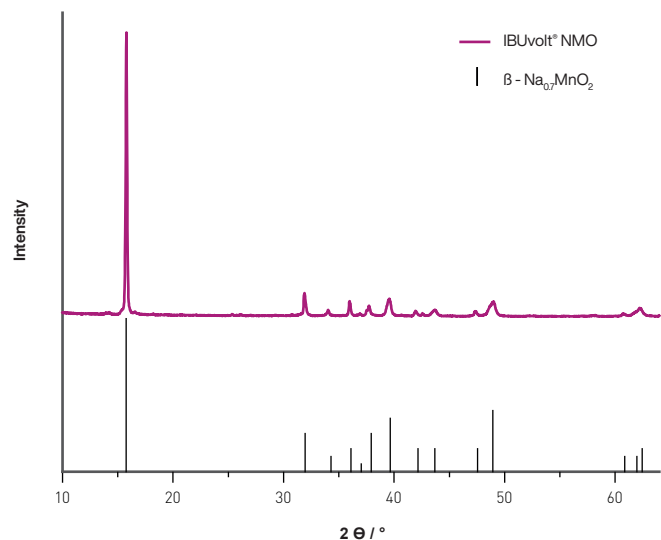
Item	Unit	Specification	Method
Na	wt.-%	15 ± 1	ICP-OES
Mn	wt.-%	52 ± 2	ICP-OES
Specific surface area (BET)	m ² /g	1 - 2	N ₂ Physisorption
Crystal structure		P2, Na _{0.7} MnO ₂	X-ray diffraction
Tapped density	g/cm ³	1.0 - 1.4	Tapped density tester
PSD, d10	μm	0.5 - 1.0	Laser diffraction
PSD, d50		1 - 3	Laser diffraction
PSD, d90		< 10	Laser diffraction
PSD, d99		< 40	Laser diffraction

ELECTROCHEMICAL TESTS

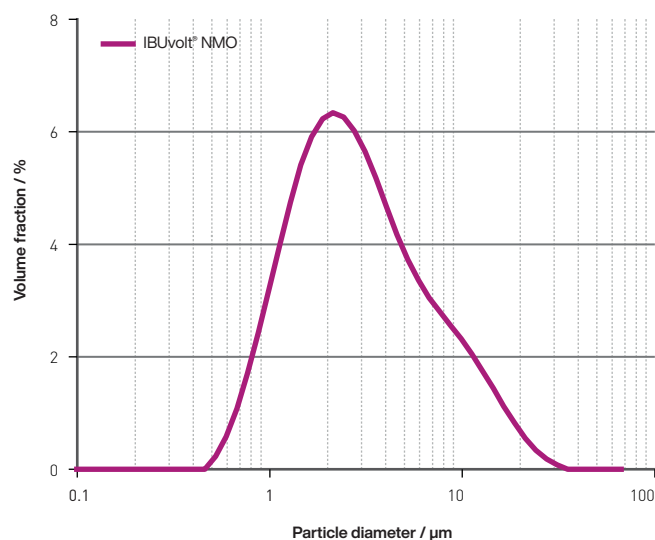
Item	Unit	Specification	Method
Specific 2 nd discharge capacity at 0.1 C*	mAh/g	> 150	Coin cells
Coulomb efficiency 2 nd cycle*	%	> 98	Coin cells

*Half cells, 26 °C, 3 mg/cm², PC|FEC|NaClO₄, 4.4 - 2.0 V

CHEMICAL & PHYSICAL CHARACTERIZATION

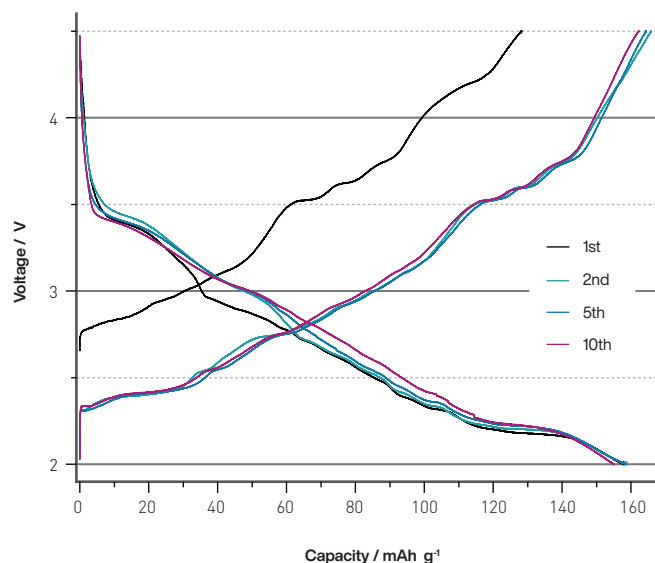
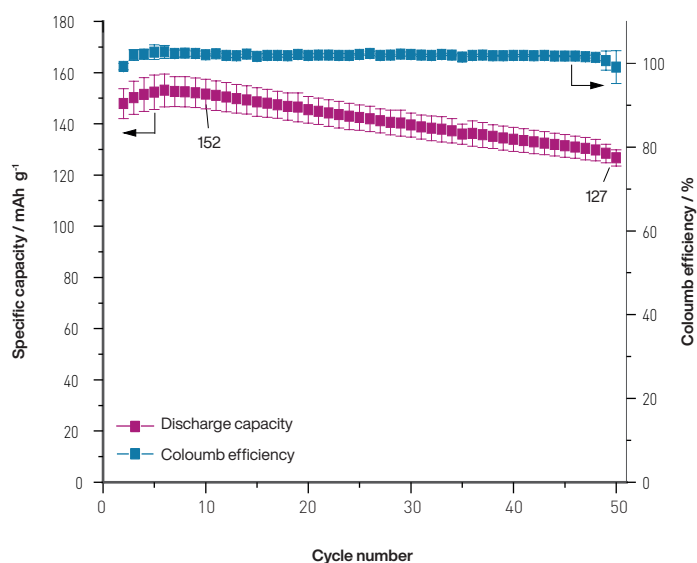


Powder X-ray diffractogram



Particle size distribution

ELECTROCHEMICAL CHARACTERIZATION (COIN CELLS)



Discharge capacity and coulomb efficiency over 50 cycles (left) and voltage-capacity curve (right)
Half cell, 26°C, 0.1C, sodium anode, 1M $\text{NaClO}_4/\text{PC}/\text{FEC}$ electrolyte



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