

CORNING

Lithium Cobalt Oxide (LCO) Ribbon Ceramics

Overview

Corning® has developed a roll to roll (R2R) manufacturing approach for fully dense lithium cobalt oxide (LCO) ceramic ribbon, enabling high performance cathode materials in unique thin, planar, and scalable form factors. This technology represents a step change in how electrochemical ceramic materials can be produced and integrated into next generation energy storage devices.

LCO Ribbon Ceramic enables uniform, thin ceramic cathodes suitable for solid state batteries, thin film batteries, and advanced electrochemical architectures where precise thickness control, surface quality, and scalability are critical.

Properties

- Continuous ribbon format to enable efficient downstream processing
- Dense and porous (15-25%) microstructures
- Thin and planar geometry with controlled thickness
- Smooth surface and fine grain structure suitable for electrochemical interfaces
- High active material utilization per unit volume
- Compatible with downstream metallization, laser processing, and stacking
- Designed for integration into solid state and thin film battery architectures

Key Features

High Active Material Density

Fully dense LCO ceramic maximizes active material per unit volume, enabling high volumetric energy density (VED) designs.

Uniform Microstructure & Surface Quality

Fine, controlled grain structure and smooth surfaces support electrode–electrolyte interface consistency critical for solid state battery performance.

Thickness & Format Control

Ribbon geometry enables precise thickness tuning to balance areal capacity, impedance, and manufacturability.

R2R Manufacturing Compatibility

Designed for scale up via continuous processing, supporting future high throughput battery manufacturing concepts.



Physical Properties

Thin, planar ceramic cathode technology for solid state and thin film batteries.

For the first time, lithium cobalt oxide cathode ceramics are available in a continuous ribbon format, enabling controlled thicknesses in the 20–40 μm range, widths up to tens of millimeters, and lengths suitable for pilot scale R2R processing. This format supports high areal capacity while maintaining uniform microstructure and surface finish.

Physical	
Composition	LiCoO ₂ (layered, HT LCO phase)
Porosity	<2% or 15-25%
Surface Roughness (Ra)	~100–300 nm (process dependent)
Grain Size	~1–5 μm
Mechanical	
Form Factor	Thin planar ceramic ribbon
Handling	Flexible at thin sections; supported processing recommended
Thermal	
Thermal Stability	Up to 400°C for compatibility with downstream processes (no binders present).
Electrochemical	
Practical Areal Capacity	~1.5–2.0 mAh/cm ² (at ~25–30 μm thickness, application dependent) ~>3 mAh/cm ² porous for thicknesses >50 μm
First Cycle Coulombic Efficiency	>95% (demonstrated in half cell testing)
Voltage Window	~3.0–4.2 V vs. Li/Li ⁺
Electronic conductivity (as-made)	- > 5x10 ⁻⁴ S/cm
Capacity Retention	Architecture and packaging dependent

Properties listed above are based on developmental and pilot scale samples and reflect expected performance based on current process conditions. Actual properties may vary with formulation, thickness, and downstream integration and are not guaranteed.

Usage



Potential Applications

- Solid state lithium batteries (single layer and stacked architectures)
- Thin film and micro battery cathodes
- Cathode supported solid state battery designs
- Advanced electrochemical test vehicles and evaluation platforms
- R&D and pilot scale battery manufacturing programs



Availability

- Developmental ribbon formats and sample sizes available on a project basis
- Thicknesses in the ~20–40 μm range demonstrated
- Custom dimensions and formats subject to technical review

Ribbon format for R2R processing may be discussed on a project basis.

Contact Us

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