

Lithium Lanthanum Zirconium Tantalum Oxide Ta_{0.25}-Li_{6.75}La₃Zr_{1.75}O₁₂ LLZTO Solid State Electrolyte Powder For Advanced Lithium Ion Batteries

Item Number: FZ61



Introduction

High-purity Ta_{0.25}-Li_{6.75}La₃Zr_{1.75}O₁₂ LLZTO solid state electrolyte powder delivers exceptional 3.8×10^{-3} S/cm ionic conductivity and cubic garnet stability for next-generation lithium metal battery research and high-voltage solid-state cell manufacturing applications.

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Application	Description	Key Benefit
All-Solid-State Lithium Batteries (ASSBs)	Used as sintered ceramic separator pellets or thin-film solid electrolyte layers paired with lithium metal anodes.	Eliminates flammable liquid solvents while preventing catastrophic lithium dendrite short-circuits.
Composite Polymer-Ceramic Electrolytes (CPEs)	Blended as an active inorganic filler into PEO, PVDF, or PAN polymer matrices for flexible solid-state cells.	Enhances overall ionic conductivity, improves mechanical modulus, and suppresses polymer recrystallization.
Cathode Composite Formulations (Catholytes)	Co-mixed with high-voltage active cathode powders (NCM, LNMO, LCO) to construct 3D conductive cathode networks.	Facilitates continuous Li ⁺ transport within thick cathode layers, reducing internal cell impedance.
Lithium Metal Anode Protective Coatings	Deposited onto metallic lithium foils or 3D current collectors as an artificial solid electrolyte interphase (SEI).	Homogenizes interfacial ion flux, prevents lithium corrosion, and promotes planar, non-dendritic lithium plating.
High-Voltage Battery Research	Employed in academic and industrial test cells investigating novel 5V-class cathode chemistries.	Delivers robust oxidative stability at elevated cell potentials without continuous electrolyte decomposition.
Solid-State Thermal Batteries & Sensors	Applied in specialized electrochemical devices and solid-state sensors operating in extreme temperature environments.	Retains structural integrity and consistent ionic transport under harsh operational profiles.

Parameter Category	Specification Metric	Reference Value (FZ61)
Material Identification	Chemical Formula	Ta _{0.25} -Li _{6.75} La ₃ Zr _{1.75} O ₁₂ (LLZTO)
Material Identification	Molar Stoichiometry	Ta : Li : La : Zr : O = 0.25 : 6.75 : 3 : 1.75 : 12
Material Identification	Product Grade / Item Code	FZ61
Purity & Grade	Overall Chemical Purity (wt%)	≥ 99.9% (3N Grade)
Physical Properties	Powder Color / Appearance	Off-White to Beige (White / Light Yellowish)
Physical Properties	Crystalline Phase Structure	Cubic Garnet Crystalline Phase (Ia-3d)
Physical Properties	Primary Particle Size (D50)	≤ 5.0 μm
Physical Properties	Sieve Particle Classification	325 Mesh
Electrochemical Properties	Bulk Lithium Ionic Conductivity (RT)	3.8×10^{-3} S·cm ⁻¹
Electrochemical Properties	Working Voltage Window	Up to 4.5V+ vs. Li/Li ⁺
Impurity Profile (Max)	Iron (Fe)	≤ 10 ppm

Parameter Category	Specification Metric	Reference Value (FZ61)
Impurity Profile (Max)	Copper (Cu)	≤ 6 ppm
Impurity Profile (Max)	Sodium (Na)	≤ 15 ppm
Impurity Profile (Max)	Titanium (Ti)	≤ 5 ppm
Impurity Profile (Max)	Silicon (Si)	≤ 15 ppm
Impurity Profile (Max)	Niobium (Nb)	≤ 20 ppm
Impurity Profile (Max)	Manganese (Mn)	≤ 5 ppm
Impurity Profile (Max)	Nickel (Ni)	≤ 4 ppm
Impurity Profile (Max)	Aluminum (Al)	≤ 50 ppm
Impurity Profile (Max)	Yttrium (Y)	≤ 25 ppm
Impurity Profile (Max)	Total Trace Transition Metals	Strictly Controlled (< 150 ppm total)
Quality Verification	Phase Identification	Verified by Powder X-ray Diffraction (XRD)