

CPS-LiPC

SWCNT Functional Additive

Technical Data Sheet (TDS) | CPS Inc.

Product Overview

CPS-LiPC is an ultra-low-viscosity ionic interfacial functional material based on aqueous Li-PAN and citric acid (CA). When blended with SWCNT, it is designed to add ion-transport and interfacial-binding functions to the electronic conductive network and to evaluate the potential for reducing SWCNT usage or improving electrode performance.

1. Purpose of SWCNT Functionalization

- Combined electronic + ionic transport network: Utilizes the electronic conductive network of SWCNT together with the ionic interfacial functionality of CPS-LiPC.
- SWCNT interfacial binding support: Evaluates the potential to improve dispersion and stabilize interfacial contact among SWCNT, active material, and binder.
- Potential SWCNT reduction: Evaluates whether equivalent or better high-rate performance can be maintained while reducing conventional SWCNT usage.
- Compatibility with aqueous processing: Ultra-low-viscosity CPS-LiPC can be blended with an aqueous SWCNT dispersion for use in conventional water-based slurry processes.

2. Typical Properties and Product Characteristics

Item	Typical Range / Property	Remarks
Appearance	Clear to pale-yellow aqueous solution	Low-odor solution
pH	7.0 ± 0.2	Neutral range
Solid Content	7.5 ± 0.5 wt%	Can be diluted to suit customer process
Viscosity	30 ± 10cP Brookfield, 2 rpm, 25°C	Values may vary depending on measurement conditions
Dispersion Medium	Water	Aqueous process
Key Features	Low viscosity · ionic functionality · CNT interfacial functionalization	CNT functional additive

3. Recommended Applications

SWCNT-based Si/C anodes and aqueous electrode systems — Blend SWCNT dispersion and CPS-LiPC on a solids basis and evaluate as a functional conductive additive.

※ Recommended blend ratio on a solids basis: SWCNT : CPS-LiPC = 9:1 to 5:5. Total SWCNT loading and the optimum blend ratio should be optimized separately according to the electrode formulation.

4. Recommended Evaluation Design

Condition	SWCNT	CPS-LiPC	Evaluation Purpose
Control	100	0	Conventional SWCNT control
9:1	90	10	Low-level functionalization
8:2	80	20	Enhanced ionic functionality
7:3	70	30	CNT reduction evaluation
6:4	60	40	Enhanced hybrid network
5:5	50	50	High-content comparison

※ Blend ratios are on a solids basis. For comparison, design the test by fixing either the total conductive-additive/additive solids in the electrode or the absolute SWCNT loading according to the evaluation objective.

5. Key Evaluation Items and Expected Effects

- Compare SWCNT dispersion stability, viscosity, and slurry compatibility.
- Evaluate the combined effect of the electronic conductive network + Li⁺ transport pathway + interfacial binding.
- Compare ICE and 1C/3C/5C/7C C-rate performance.
- Compare interfacial and conductive characteristics through EIS and electrode resistance measurements.
- Evaluate the potential to reduce SWCNT usage while maintaining equivalent performance.

6. Application Guide

- Always include an SWCNT-only control and compare under identical electrode conditions.
- Uniformly blend the aqueous SWCNT dispersion and CPS-LiPC under low-speed stirring, avoiding excessive shear that may damage the CNT network.
- It is recommended to first verify high-rate performance at the 5:5 condition, then explore the optimum point toward 6:4 and 9:1.

7. Handling and Storage

Store tightly sealed at room temperature. Avoid freezing, high temperatures, and prolonged exposure to direct sunlight. After long-term storage, check appearance, pH, viscosity, and any sedimentation before use.

Final performance and the SWCNT-reduction effect should be confirmed through the user's actual electrode manufacturing and cell evaluation.