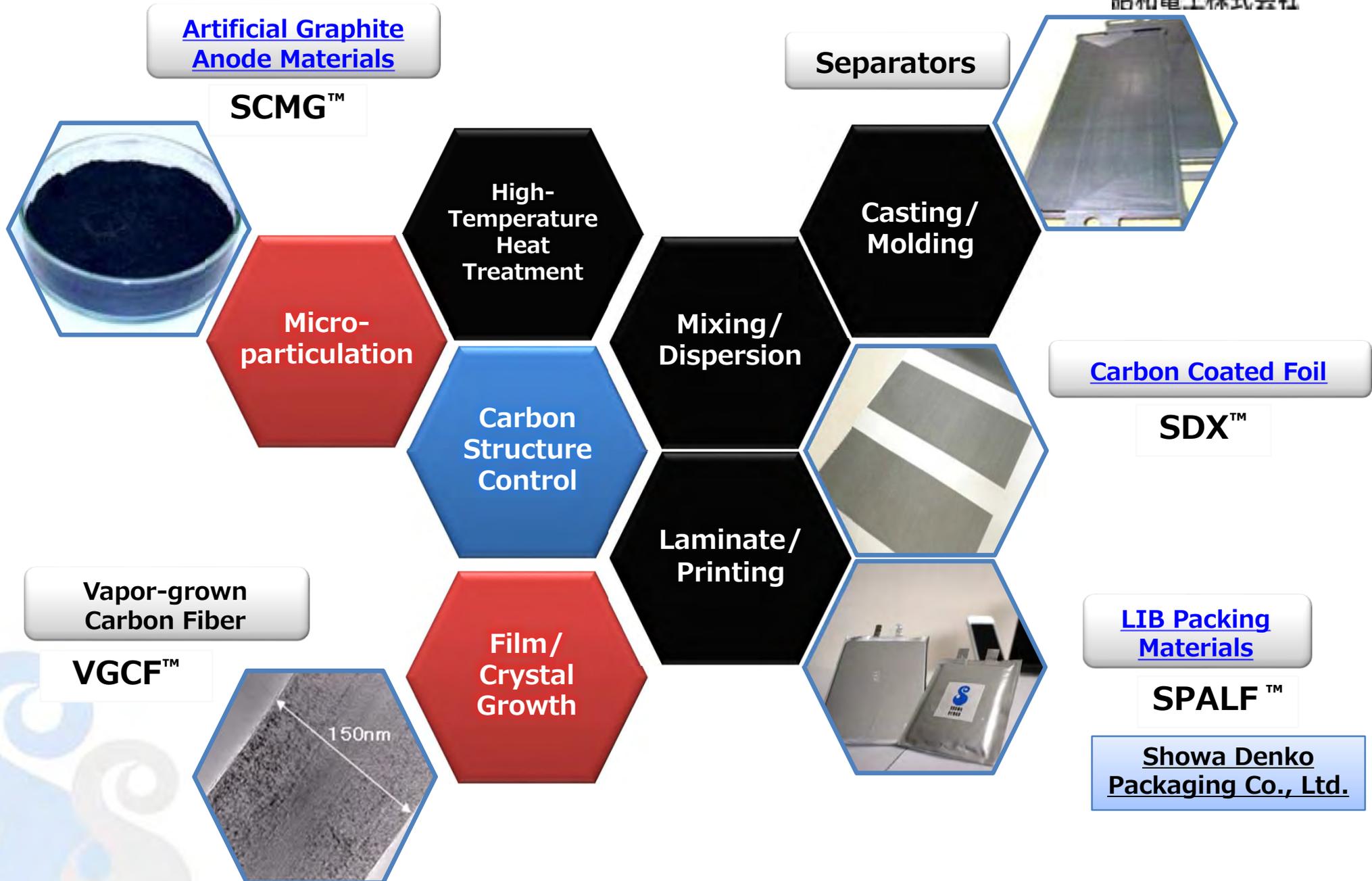


Advanced Battery Materials



Anode Material for Lithium Ion Secondary Batteries

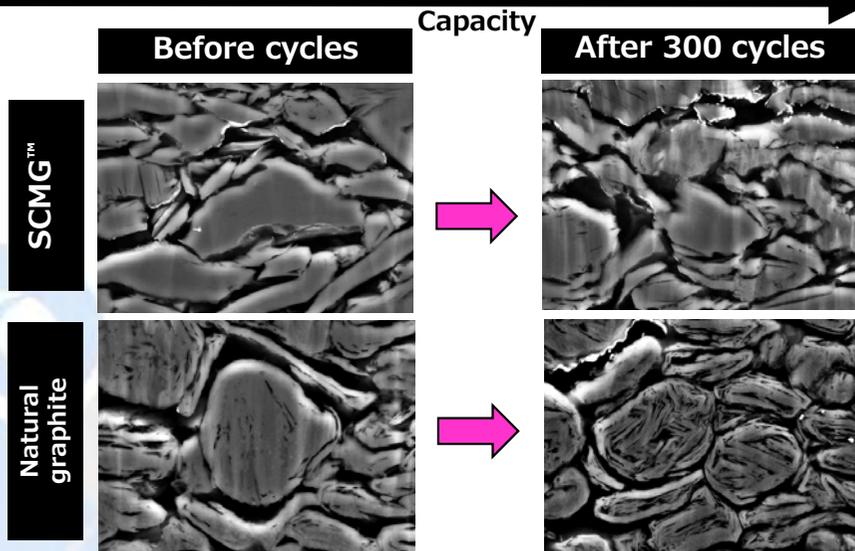
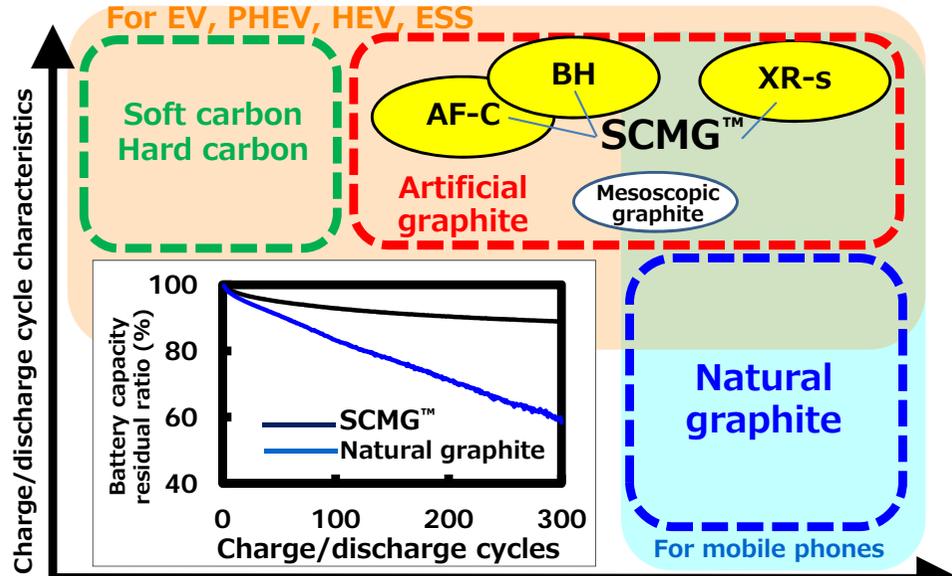
~SCMG™~



昭和電工株式会社

Product example

Lithium ion secondary battery negative-electrode material SCMG™ (Structure Controlled Micro Graphite)



We provide a negative-electrode carbon material that suffers no degradation by charge-discharge cycles.

Our technologies

Fine particle treatment technology

Technology to control the particle size in accordance with various materials

Heat treatment technology

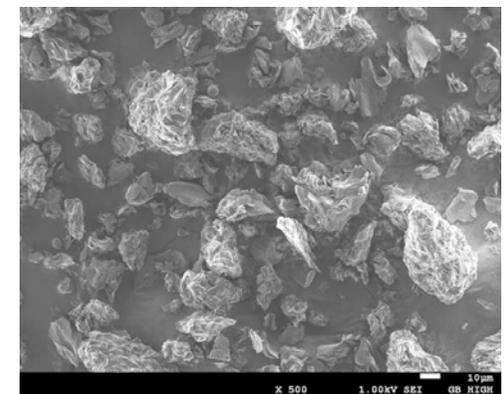
Our original technology developed for manufacturing graphite electrodes

Primary calcination technology with atmospheric control

Secondary calcination technology to control the carbon structure



Heat treatment facilities

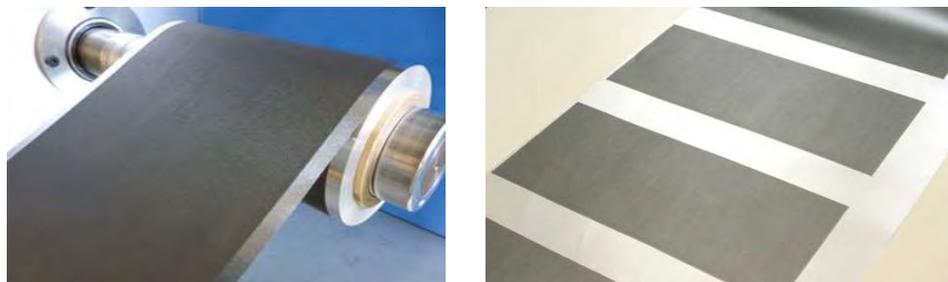


Fine particles with carbon structure controlled

Product example

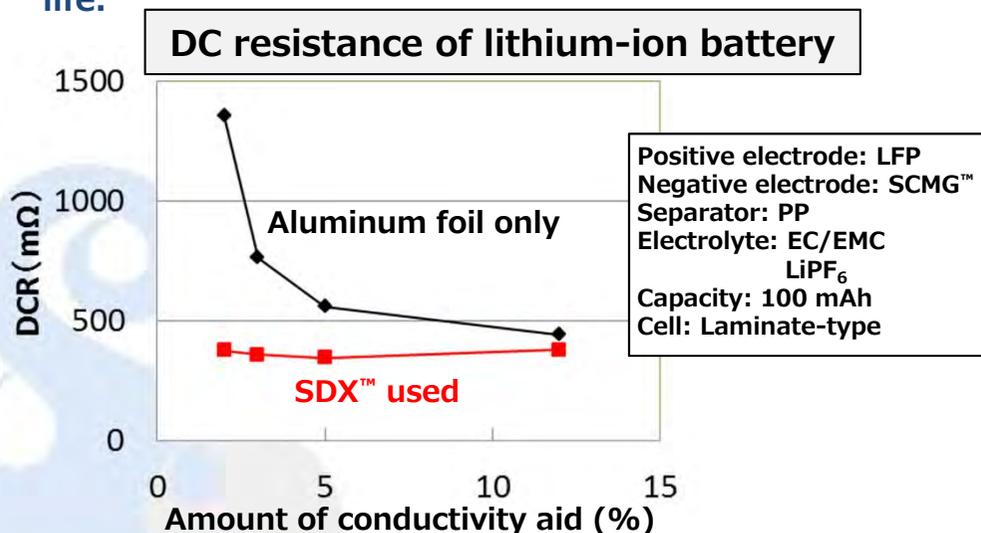
Current collector for Lithium ion & battery electric double-layer capacitor

➤ **Current collector with high-conductivity carbon particles and binder coated on aluminum foil**



Various patterns printable
(Continuous coating, intermittent coating)

➤ **Significant reduction of the interface resistance between the active material layer and current collector**
⇒ lower resistance, fast charge/discharge, and longer life.



Our technologies

■ Material design technology

Optimum design of aluminum foil, carbon particle, and binder resin
⇒ Products that integrate metals, inorganics, and organics

■ Paint-making technology

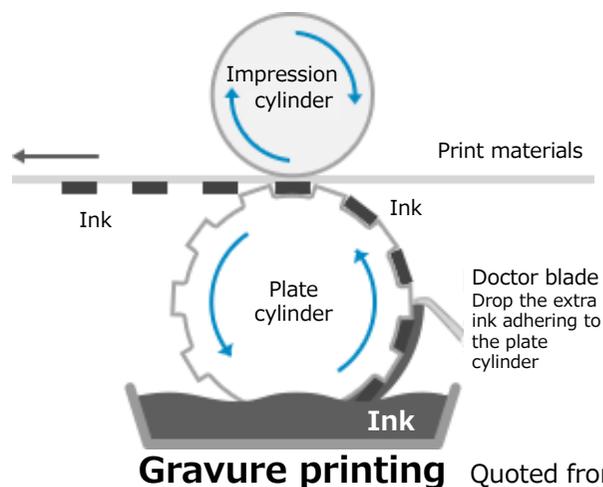
Optimization of mixing and dispersion treatment of materials
⇒ Viscosity control, sedimentation prevention, measures to deal with coarse particles

■ Printing technology

Thin-film, uniform, and high-speed gravure printing technology
⇒ High quality, mass-production, cost competitive

■ Battery production/evaluation technology

Comprehensive evaluation of not only carbon coated foils but also batteries
⇒ Proposal of recipes to customers, resolution of technical issues



Pouch LiB

Quoted from Showa Denko Packaging website

Showa Denko
Packaging Co., Ltd.

Product example



Pouch LiB

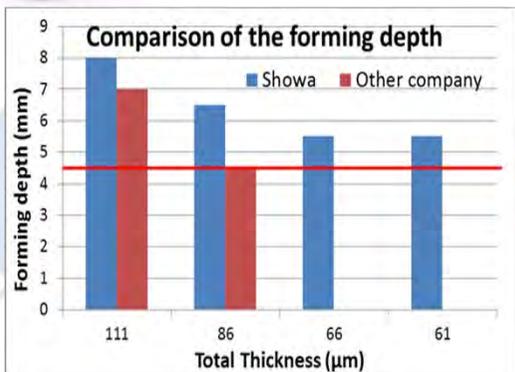


SPALF™

Example of SPALF™ constituents



Development of Pouch LiB Application
2000 → 2015



Characteristics of SPALF™

- Light weight
- Unrestricted product shape
- Good formability
- Insulation properties

Our technologies

■ Paint (Coating technology)

- Thin film coating technology

■ Laminate (Lamination technology)

- Lamination technology suitable for constituent materials

■ Create (Molding technology)

- Die design technology to realize product shape
- Adhesive evaluation technology suitable for product applications



Dry laminator/coater

Showa Denko Packaging (SPA) Corporate Philosophy: We can offer products created by “paint, laminate, create” technology to the world, and contribute to the development of society.