

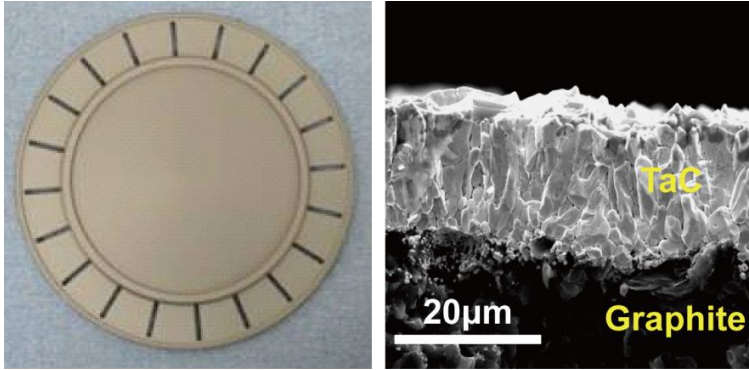
New functional carbon powders “CNovel” with inter-connected mesopores

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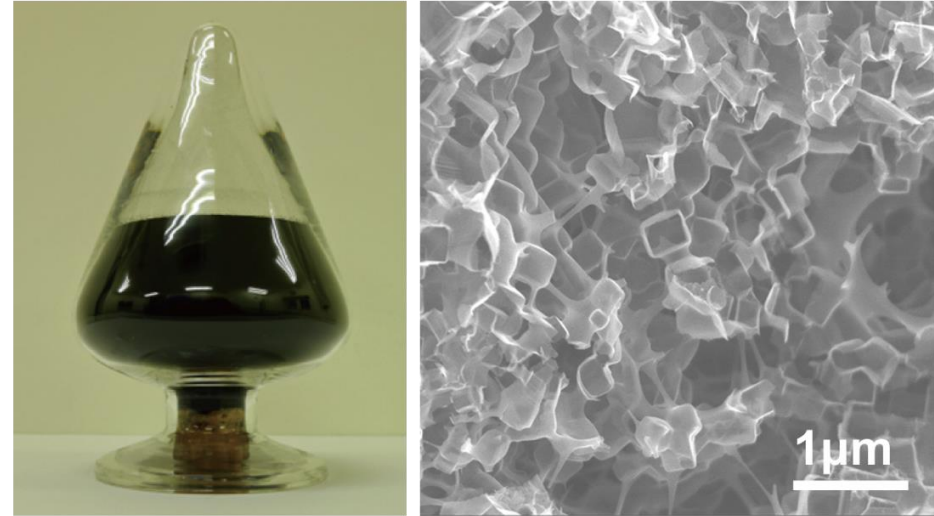
2014年9月30日

東洋炭素株式会社



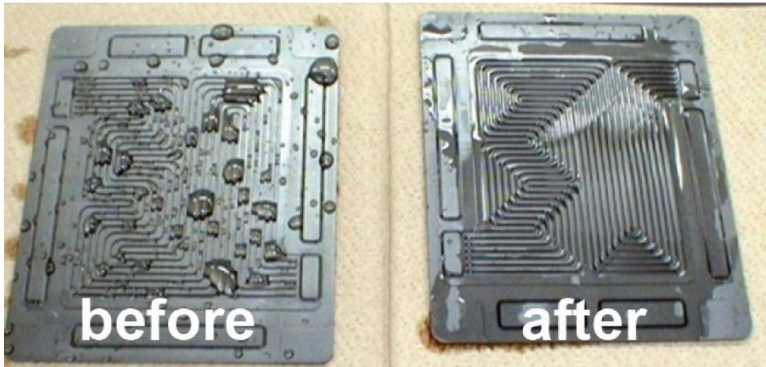
EVEREDKOTE

TaC-coated Graphite



CNovel

Porous Carbon Powders



F₂ modification

Fluorine Surface Modification

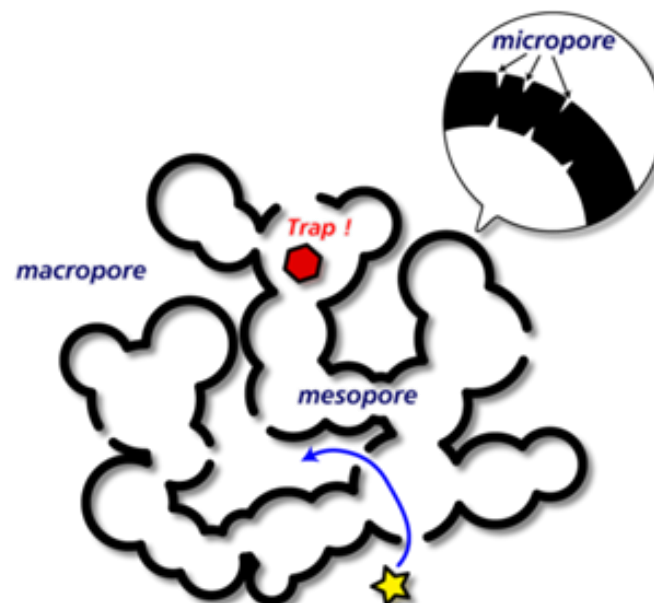
CNovel

- Carbon powders
- large surface area
- inter-connected mesopores
- 3-dimensional carbon layer structure

	CNovel
BET surface area / $\text{m}^2 \text{g}^{-1}$	1500
Total pore volume / mL g^{-1}	2.7
Designed pore size size / nm	5
Bulk density / g mL^{-1}	0.1

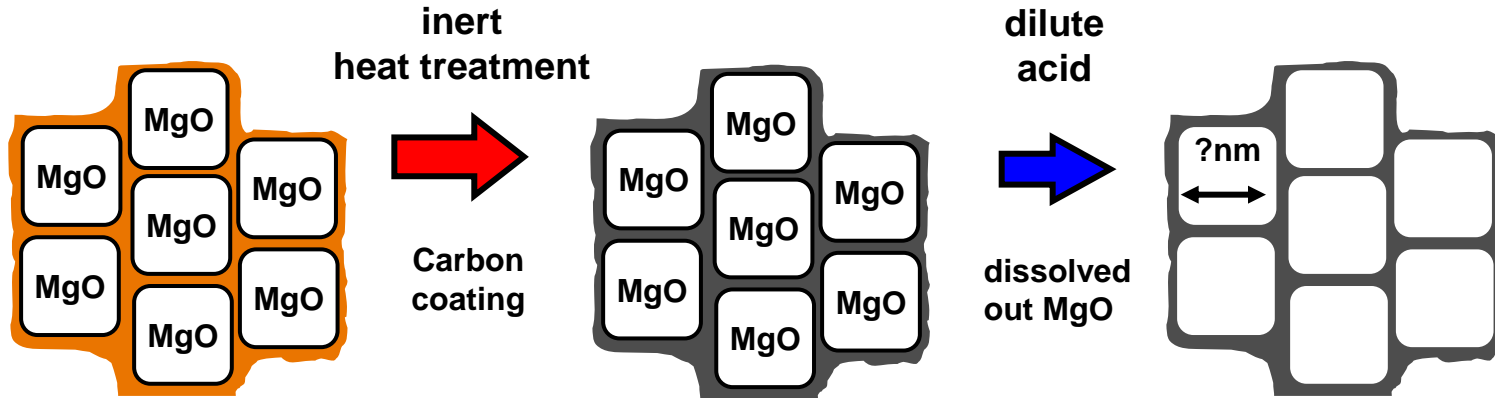


Fine powders

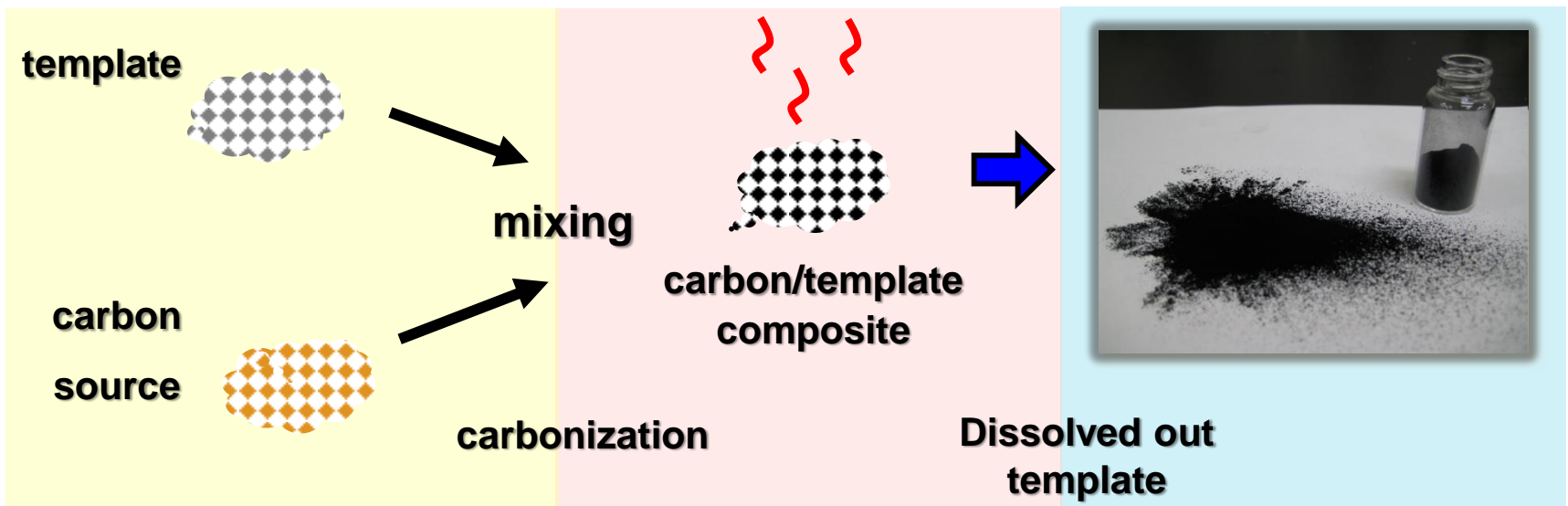


Schematic illustration of the interconnected structures on CNovel

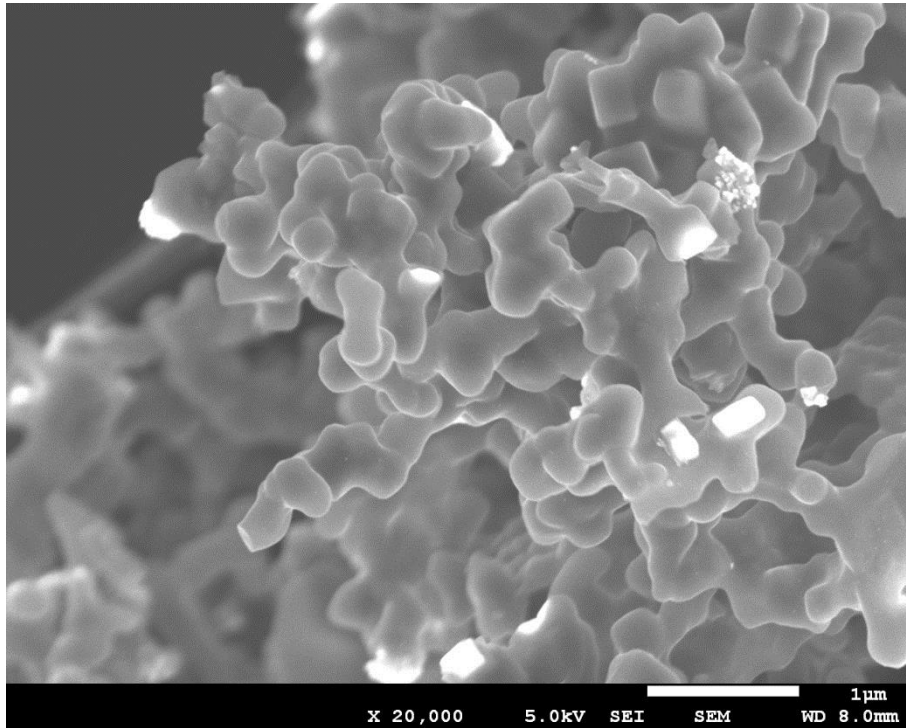
• Carbon-coating Process



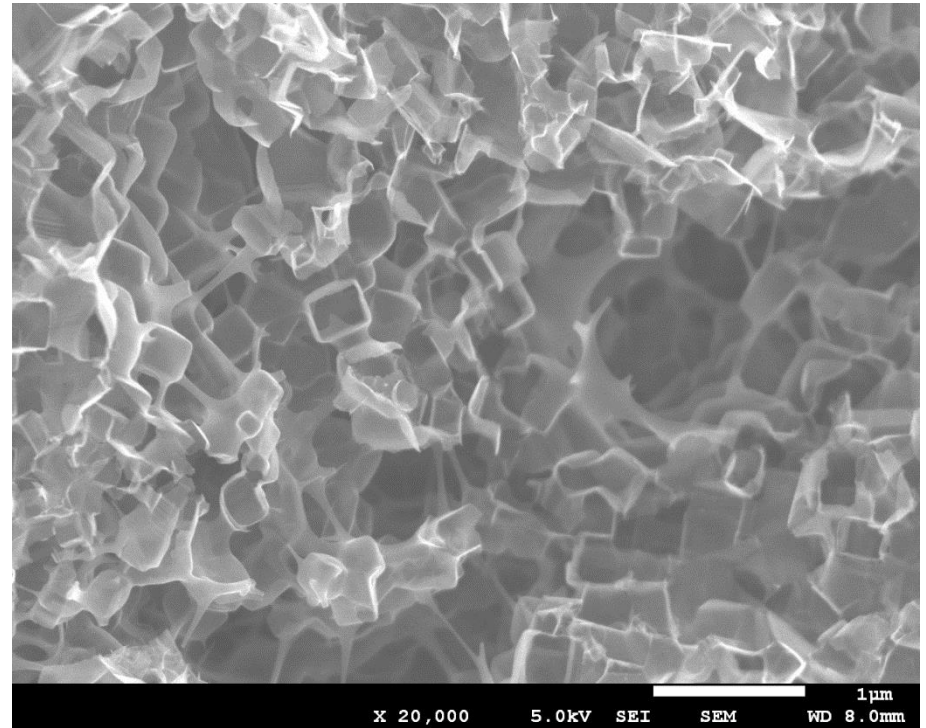
This process of construction can prepare it as industrial materials.



Carbon/template composite



Dissolved out template



Total ash : under 200ppm
Carbon layer : about 4nm

Inter-connected
mesopores structure

High diffusivity
performance

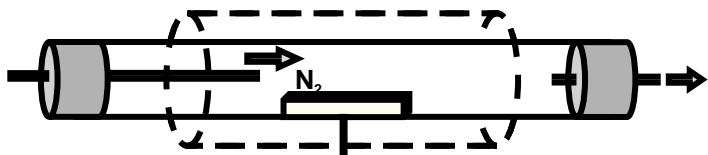
Complex
three dimensional structure

Rigid carbon walls

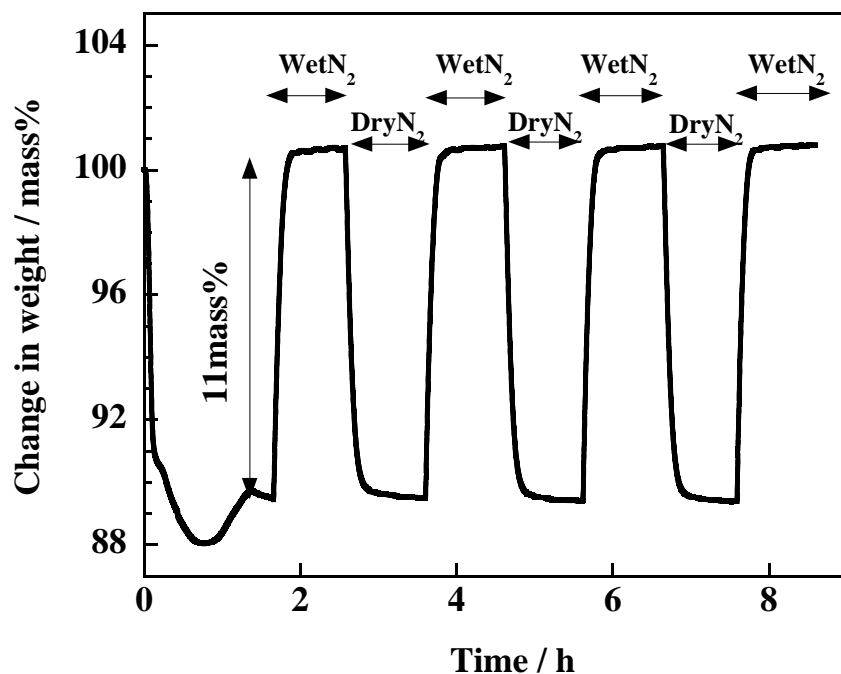
Inter-connected mesopores
and
three dimensional structure

Crystallinity control

High diffusivity performance



Change of weight of CNovel under flowing water vapor.



Inter-connected pore

Micropore

Mesopore

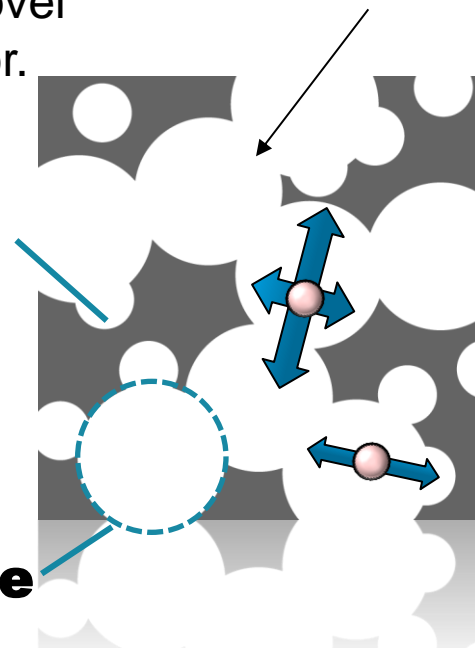
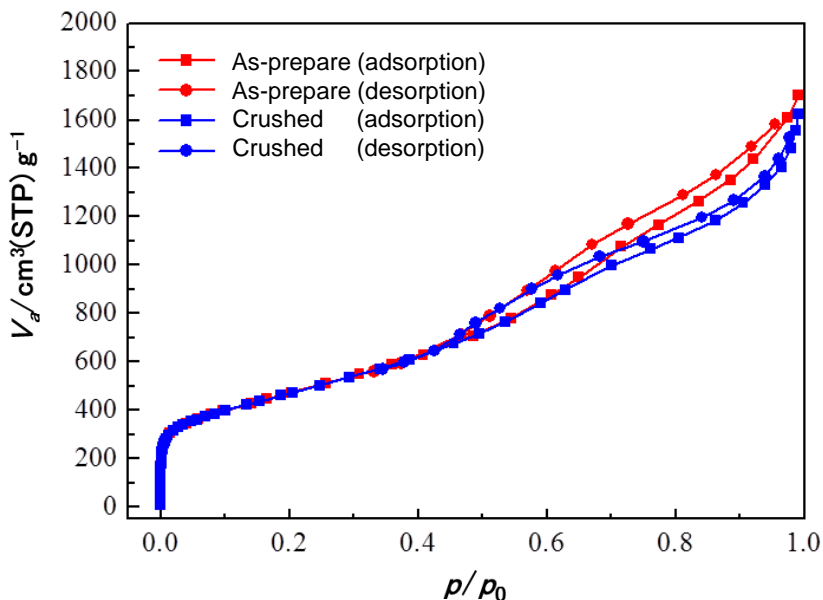


Image of CNovel

CNovel has inter-connected mesopores and shallow micropores.

→ **High diffusivity performance**

Rigid carbon walls

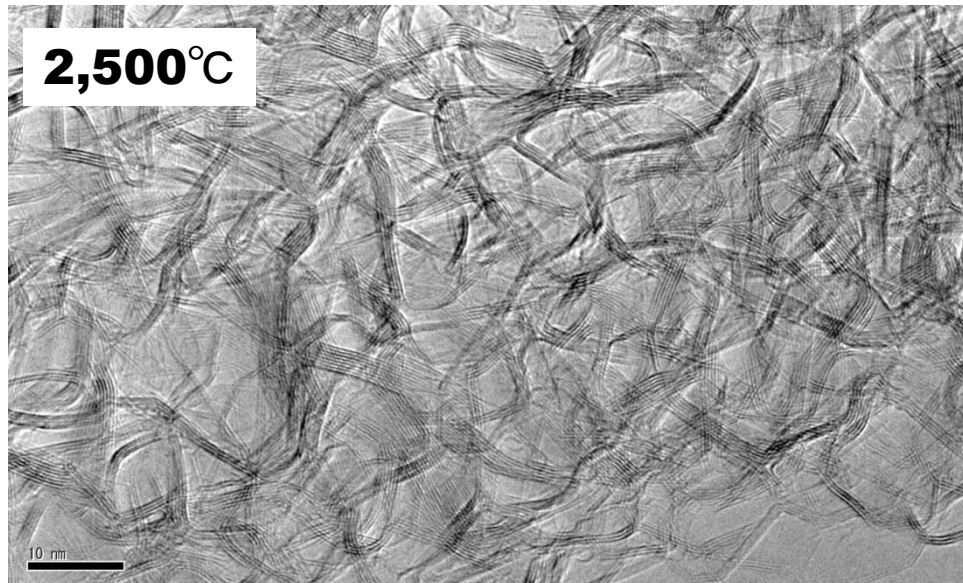
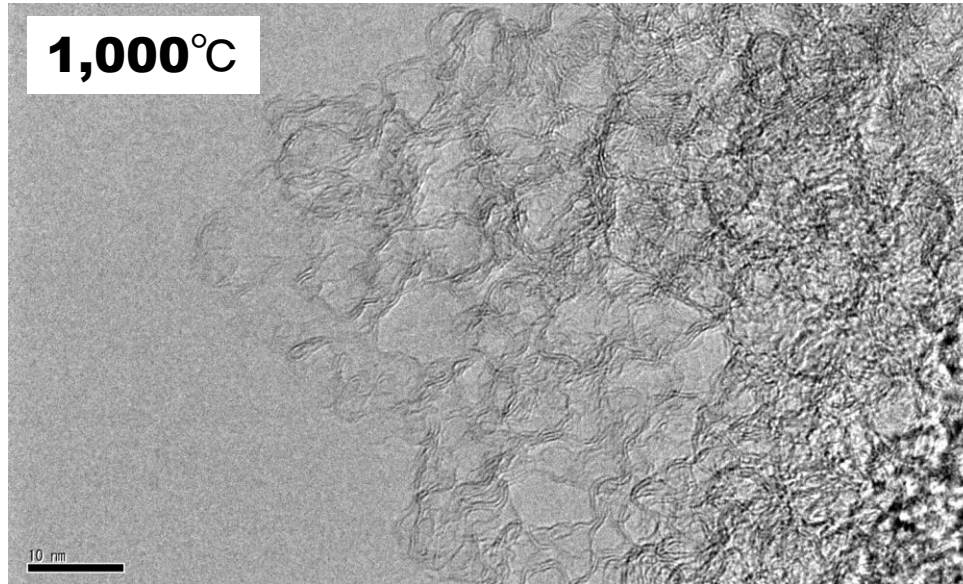


	Bulk density / g mL⁻¹
As-prepare	0.09
Crushed	0.10

The carbon structure morphology
is maintained in its initial state

Carbon wall composed 3-D carbon layers.
Carbon walls of CNovel are rigid .

Change of crystallinity on 3-D carbon layer



	Bulk density / g mL ⁻¹	True density / g mL ⁻¹
1,000°C	0.10	2.07
2,200°C	0.10	1.14
2,500°C	0.12	1.30

When high temperature heat-treatment, true density **decreased** But Bulk density **didn't change**.

→Crystallinity has grown by heat-treatment.
Mesopores morphology doesn't **change**.

CNovel can be able to control crystallinity

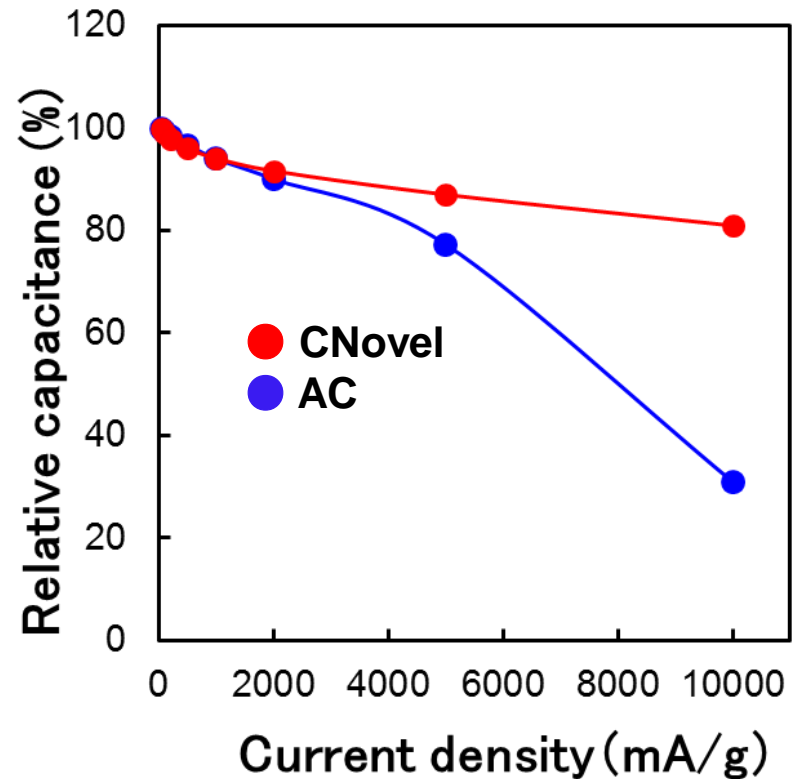
Example of applications

One of our applications target
**electrode for
energy storage device.**

For example : EDLC
Superior in the
high rate performance

Other targets are
Food, Medical and ...

The EDLC performance of CNovel



We can control characterization for CNovel

	Basic grade	Adjustable value
BET surface area / $\text{m}^2 \text{g}^{-1}$	1500	500 ~ 1800
Total pore volume / mL g^{-1}	2.7	~ 3.0
Designed pore size / nm	5	2 ~ 150
Bulk density / g mL^{-1}	0.1	0.1 ~ 0.5

For example ,
the size of mesopores is
adjusted to meet with
customer's requests.



selective adsorbent

we are able to offer suitable CNovel
to meet customer's needs.