Long and High Density Aligned Carbon Nanotubes for Dry Processing

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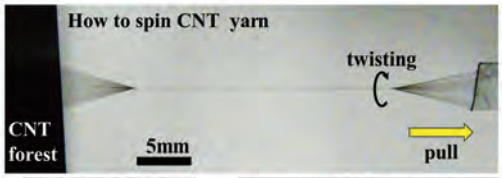
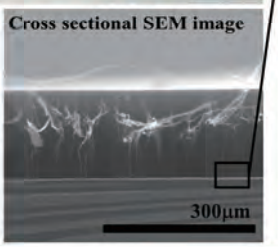
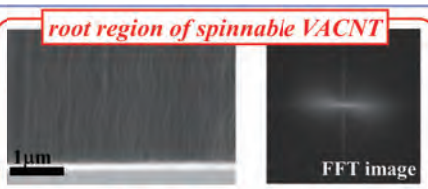
Synthesis of Spinnable VACNT





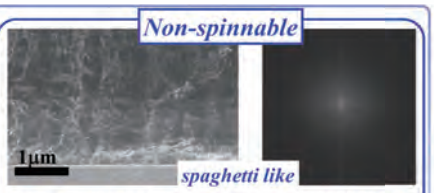
CNTs were;
- 300μm of length
- 2-5 graphite layers
- <10nm of diameter

root region of spinnable VACNT



➢In case of spinnable VACNT, a root part was straight. This meant that catalyst (iron) particles kept active and CNTs existed densely.

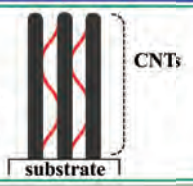
Non-spinnable



➢A root part of unspinnable VACNT was curly. This originated in a decrease of active catalyst particles. Namely, CNTs existed sparsely.

Why spinnable??

For CNT spinning, sharing of CNTs (red in schematic figure at right) is necessary. When the straight CNTs (black) are drawn, these shared CNTs help joining the next CNTs at top or root parts.



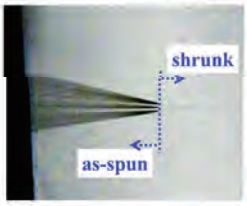
Electrical Property (I-V Measurement)

1.8×10^{-2} Ωcm

1.9×10^{-3} Ωcm

- Compared non-treated and shrunk yarn.
- CNT yarns which were drawn with same width were fixed on glass.

Shrunk CNT yarn?

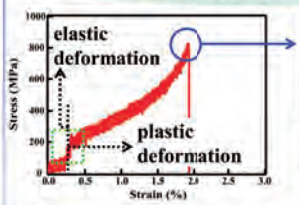


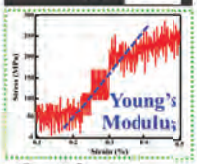
Shrunk by ethanol drop.

Each CNTs became close.

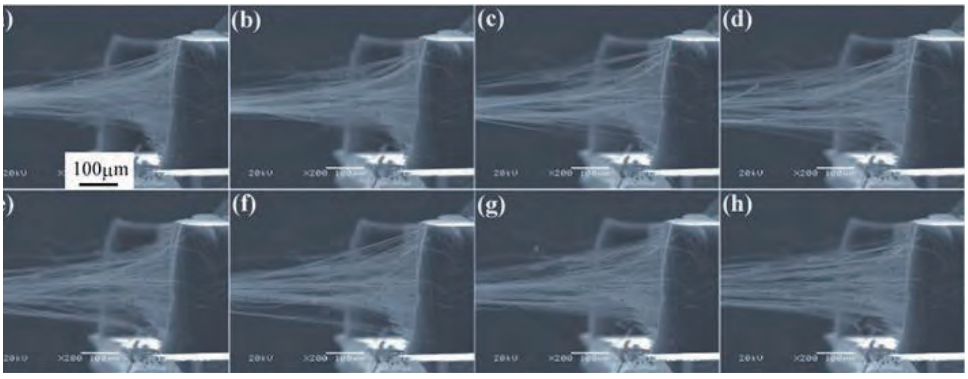
Resistivity of shrunk yarn was improved to ~1/10 of pristine!!

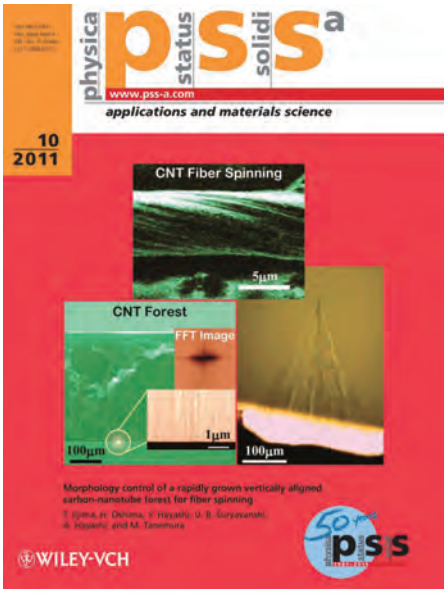
Mechanical Property





- Tensile test was carried out in SEM chamber.
- CNT yarn was shrunk by ethanol.
- CNT yarn had fractured at 1.9% of strain and 800MPa of stress.
- Young's Modulus of CNT yarn was ~130GPa.
- Fracture was caused by slide between CNTs.





Advanced Nanocarbon Center for Composite Structural Materials: ANCS

COI STREAM

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