Supporting Information

Stable Dispersion of Carbon Nanotube in a Molten Salt of KNO_3-$NaNO_3$-$NaNO_2$-$LiNO_3$-LiOH

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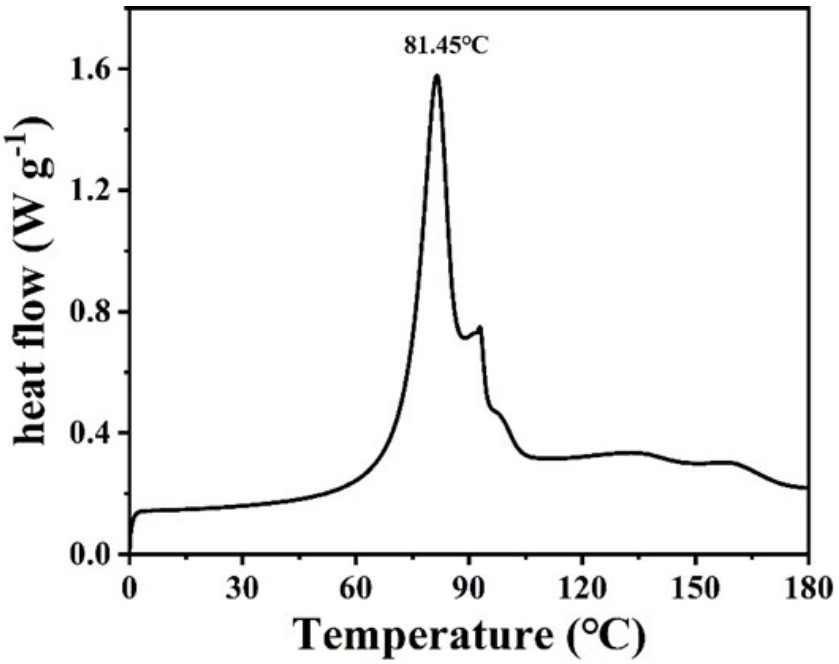

Fig. S1. DSC curve of the KNO_3 - $NaNO_3$ - $NaNO_2$ - $LiNO_3$ mixed salt, displaying a melting point at 81.45 °C.

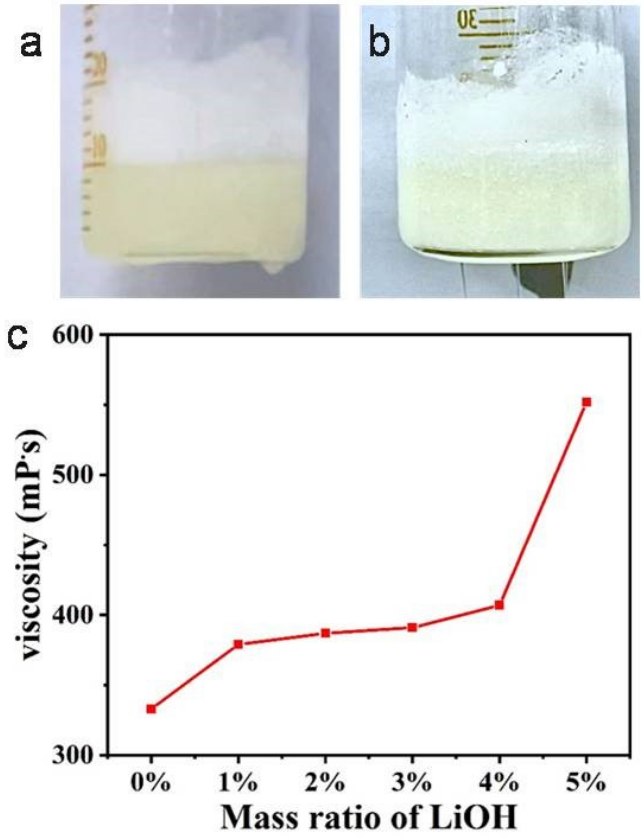

Fig. S2. The salt of KNO_3 - $NaNO_3$ - $NaNO_2$ - $LiNO_3$ with (a) 4.0 wt% and (b) 5.0wt% LiOH, showing the liquid and suspension state, respectively. (c) Viscosity of the salts as increasing the LiOH content.

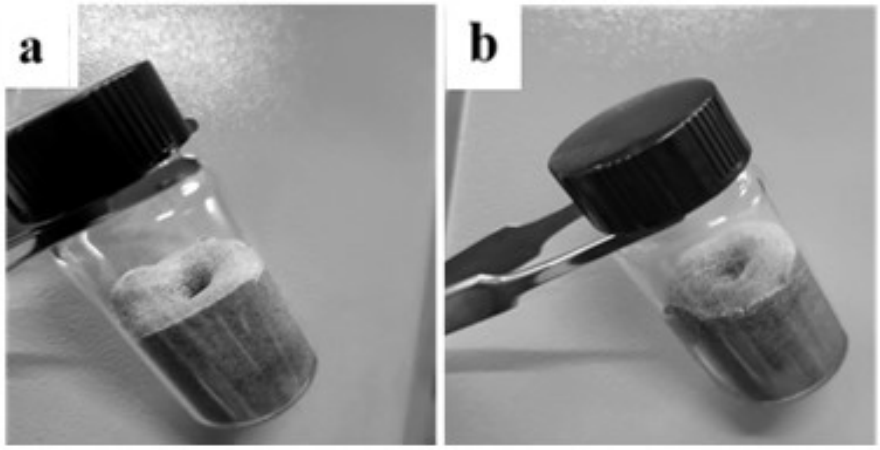

Fig. S3. (a) 1.0 wt% and (b) 2.0 wt% CNTs in 4.0 wt% LiOH-quaternary nitrate in the condensed cooling state, displaying no phase separation.

Table S1. XPS measured the proportion of each element in the CNTs treated with quaternary nitrate molten salt/LiOH (the proportion of the CNTs is 0.2 wt.%).

Elemental	Atom%
C	96.95
Li	2.06
K	0.81
Na	0.17

There is a certain difference between the content/proportion of elements measured by XPS and ICP element analysis in the CNTs. It is inferred that XPS analyzes surface of the material, so it measures element content on the surface, while ICP tests the elements of the whole sample. This indicates that some Li, K and Na elements may be inserted into a single nanotube in the form of ions.

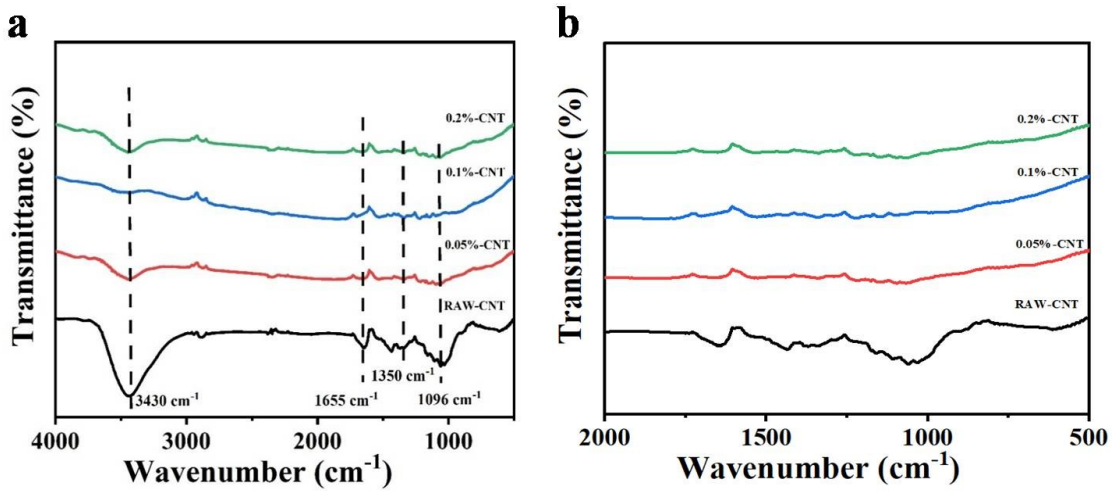

Fig. S4. (a) FT-IR spectrum and (b) enlarged FT-IR spectrum of the dispersed CNTs, supporting the treatment was a nondestructive dispersion method.

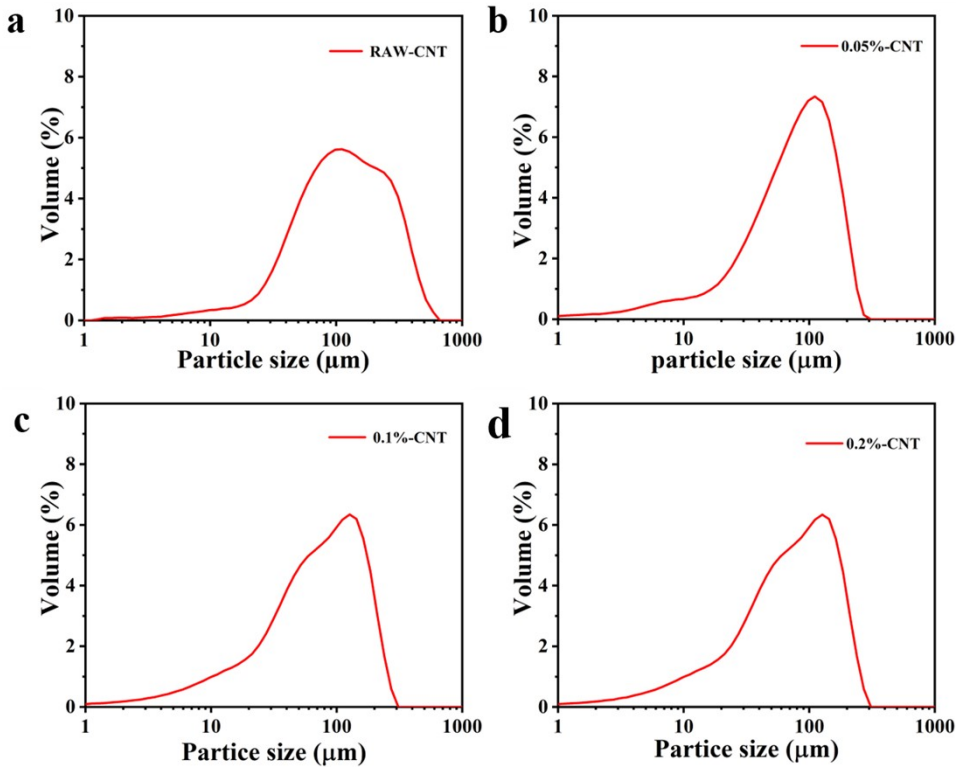

Fig. S5. Particle size analysis of (a) Raw-CNT, (b) 0.05 wt%-CNT, (c) 0.1 wt%-CNT, and (d) 0.2 wt% CNT.

Table S2. Particle size distribution of the CNTs.

	D10（um）	D50（um）	D90（um）
RAW-CNT	37.4	120	382
0.05 wt%-CNT	19.5	83.5	175
0.1 wt%-CNT	15.1	77.4	185
0.2 wt%-CNT	33.9	138	215

The wide particle size distribution of the original carbon nanotubes is 10-1000 μm, which indicates that the particle size of the original CNTs is very uneven, perhaps caused by the poor dispersion in water. The particle sizes of the CNTs with different contents treated with quaternary nitrate molten salt/LiOH were decreased, and the distribution became narrower, indicating that the particle size uniformity was improved after the quaternary nitrate molten salt/LiOH treatment.

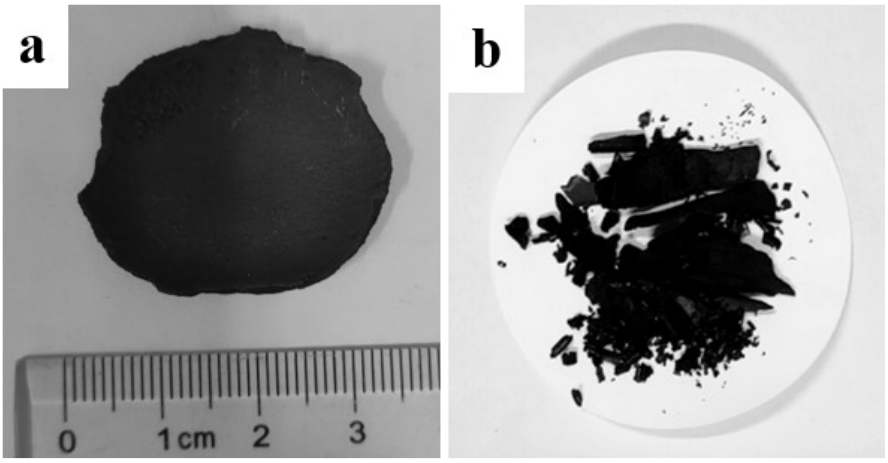

Fig. S6. Digital photographs of the CNT films prepared by using the milled CNTs, showing that the film was easily cracked. (a) the original film formed by filtration, (b) fragment state after being picked up.

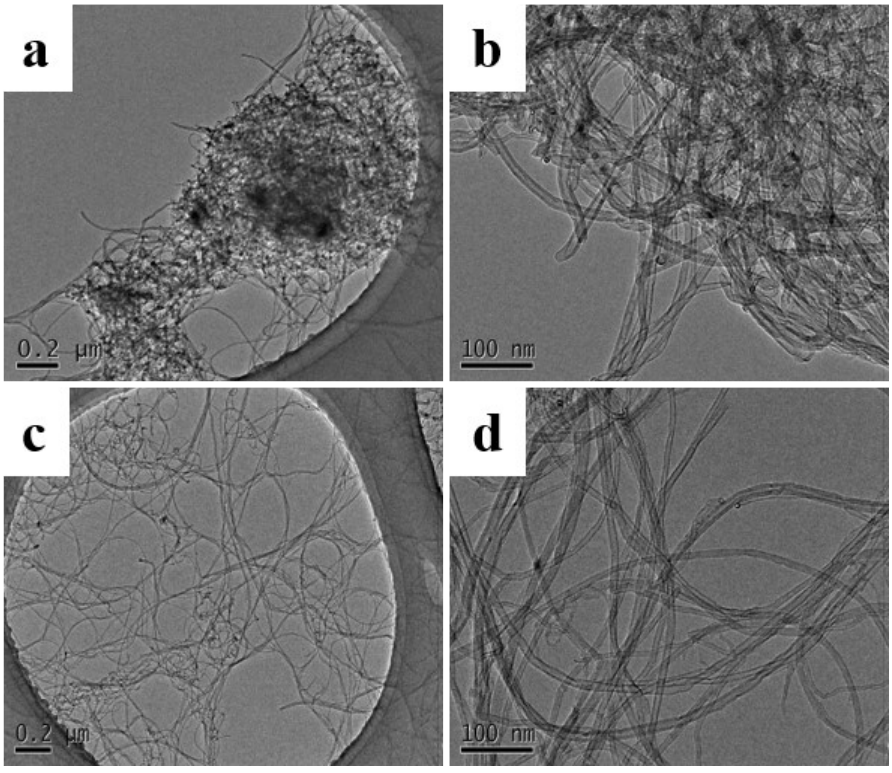

Fig. S7. Low- and high-magnification TEM images of the CNTs taken from (a, b) the milled CNT film and (c, d) LiOH-molten salt treated CNT film.