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Electronic Supplementary Information

Solvent Basicity Promotes the Hydride-mediated Electron Transfer Doping of Carbon Nanotubes

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S1. Abbreviation

BenzOH	benzyl alcohol
BuOH	1-butanol
EtOH	ethanol
MeOH	methanol
MeCN	acetonitrile
NMP	N-methylpyrrolidone
DMF	N,N-dimethylformamide
DMAc	N,N-dimethylacetamide
DMSO	dimethyl sulfoxide
DMI	1,3-dimethyl-2-imidazolidinone
NFP	1-formylpiperidine
CHP	N-cyclohexyl-2-pyrrolidone

2. Materials and methods

Materials: Reagents and solvents were used as received. For absorption measurements, 5 mg of SWNTs (Meijo Nano Carbon EC2.0) were sonicated in 10 mL of water with 1 wt% Pluronic F127 (BASF) and its dispersion after centrifugation at 10000 rpm was filtrated on 25 mm PTFE membranes. These films were transferred onto PET or glass substrates. Their film thickness was controlled by adjusting the amount of dispersion. Bulk SWNT films (buckypapers) were prepared following the reported procedure.[6]

Characterization: Absorption spectra were recorded using an infrared microscope (Bruker Optics HYPERION2000) with a spectrometer (Bruker Optics TENSOR II). DC electrical conductivity was measured using the four-point probe method (Mitsubishi Chemical Analytech Loresta GP Model MCP-T610). Thermopower was recorded using a Seebeck coefficient measurement system (MMR technologies K20SB100-3R) with a Joule–Thomson effect temperature controller.

3. The formation of MG+ in the doping reaction

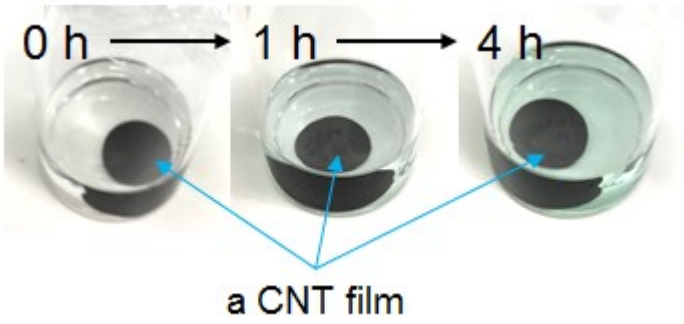

Figure S1. Color change in MGH MeCN solution at 80 ^{o}C, with SWNT films.

4. The formation of MG^+ in the doping reaction

The formation of MG^+ was detected by the appearance of an absorption peak around 630 nm. To investigate solvent effect on the formation of MG^+, the absorption peak was normalized by the peak of malachite green oxalate, ionized form of malachite green.

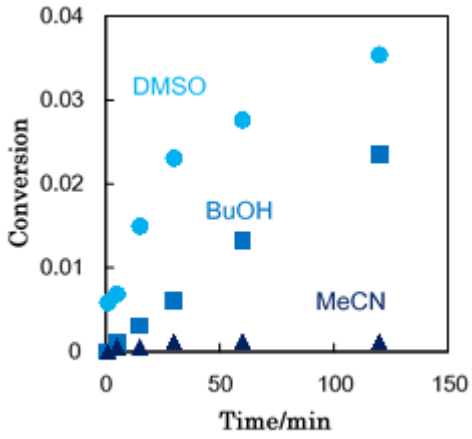

Figure S2. Formation of MG^+ in MGH (0.2 mM) solution with $FeCl_3 \cdot 6H_2O$ (0.4 mM). The conversion of MGH to MG^+ was obtained by A_{MG}/A_{MGO}, where A_{MG} and A_{MGO} are the molar absorptivity at 630 nm of MG^+ in MGH solution and that of malachite green oxalate, respectively.

5. Semiconductor sorting

SWNTs were dispersed in a PFO solution prepared by dissolving polymer in toluene at a concentration of 0.4 mg/mL. The excess polymer was removed by centrifugation at 13,000 rpm for an hour. Approximately 70 % supernatant was collected for further use.