Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Electronic supplementary information

Temperature dependent water solubility of iodine-doped single-walled carbon nanotubes prepared by an electrochemical method

Hayong Song[a], Yosuke Ishii[a] , Ayar Al-zubaidi[a] ,Takenobu Sakai[b] and Shinji Kawasaki*[a]

[a] *Nagoya institute of technology, Gokiso, Showa, Nagoya 466-8555, Japan. Fax:+81-52-735-5221; Tel: +81-52-735-5221; E-mail: Kawasaki.shinji@nitech.ac.jpc*
[b] *Toyota motor corporation, 1200, Mishuku, Susono 410-1193, Japan. Fax: +81-55-997-7879; Tel: +81-55-997-7327; E-mail: sakai@ceram.tec.toyota.co.jp*

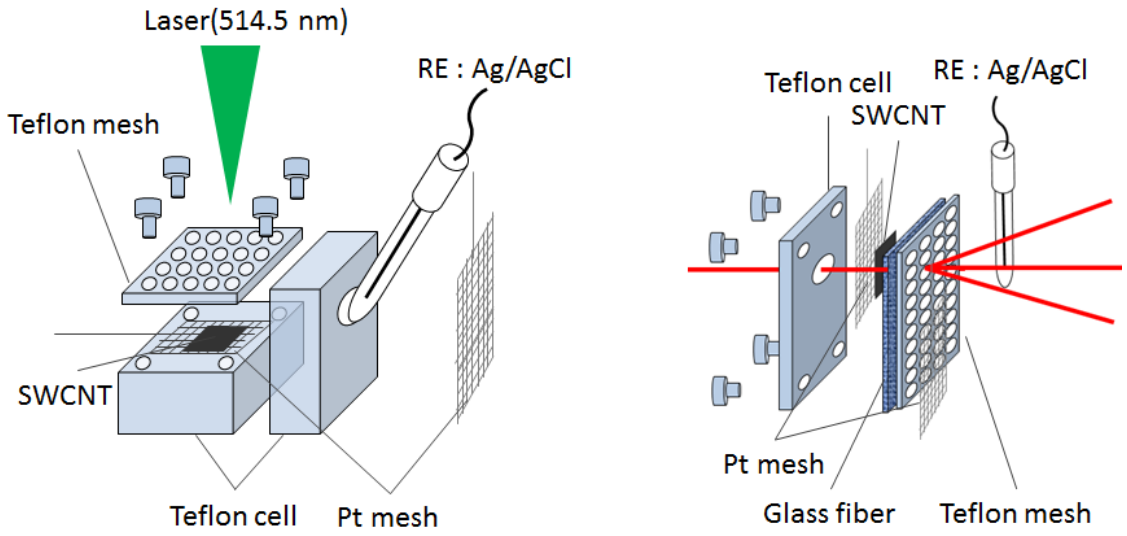

Fig. S1 In situ cell for Raman scattering study(a), X-ray diffraction(b).

Both of cells are designed for in situ study in the electrolyte under an applied potential. The in situ cell for Raman study, cell was dipped into the electrolyte, while in the case of the in situ cell for X-ray diffraction, electrolyte got absorbed into the cell (glass fiber) like capillary action. Working electrode and Reference electrode were fixed to maintain the distance of both electrodes by the Teflon cell and glass tube, respectively.

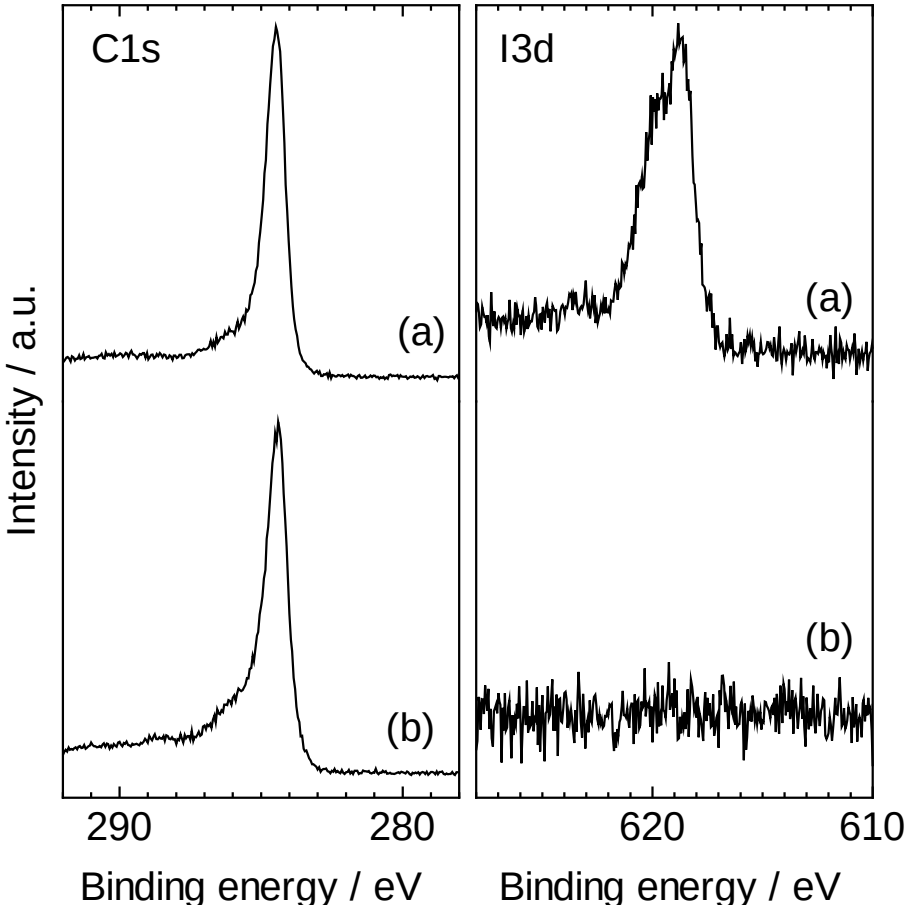

Fig. S2 XPS spectra of iodine doped SWCNT(a), and pristine SWCNT(b).

Fig. S2 shows the XPS spectra of iodine doped and pristine SWCNT sample. In the XPS C 1s spectra peak located at 284.5 eV assigned to the sp^2 carbon is shown. We can also find peaks assigned to poly iodide ions in XPS I $3d_{5/2}$ spectra.

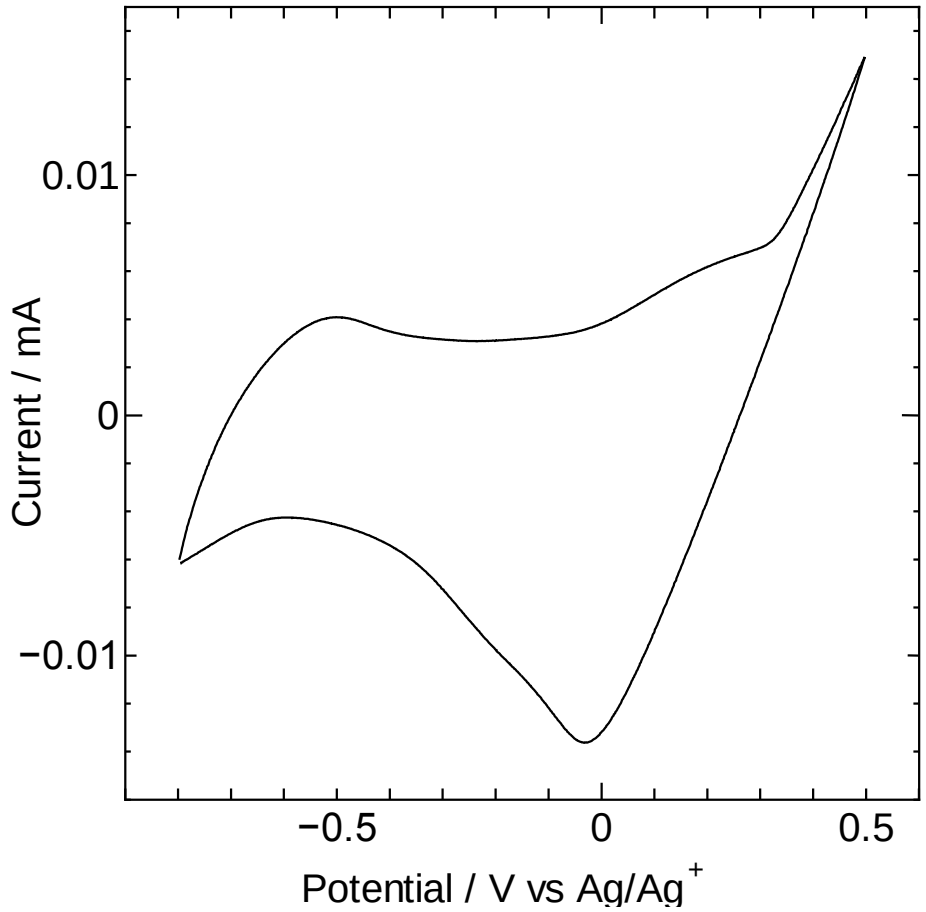

Fig. S3 Cyclic voltammetry of SWCNT in 1 M NaI aqueous solution. Working electrode : SWCNT, counter electrode : Pt mesh/activated carbon fiber, and reference electrode : Ag/Ag^+ are fabricated. The scan rate was 100 mV/s.

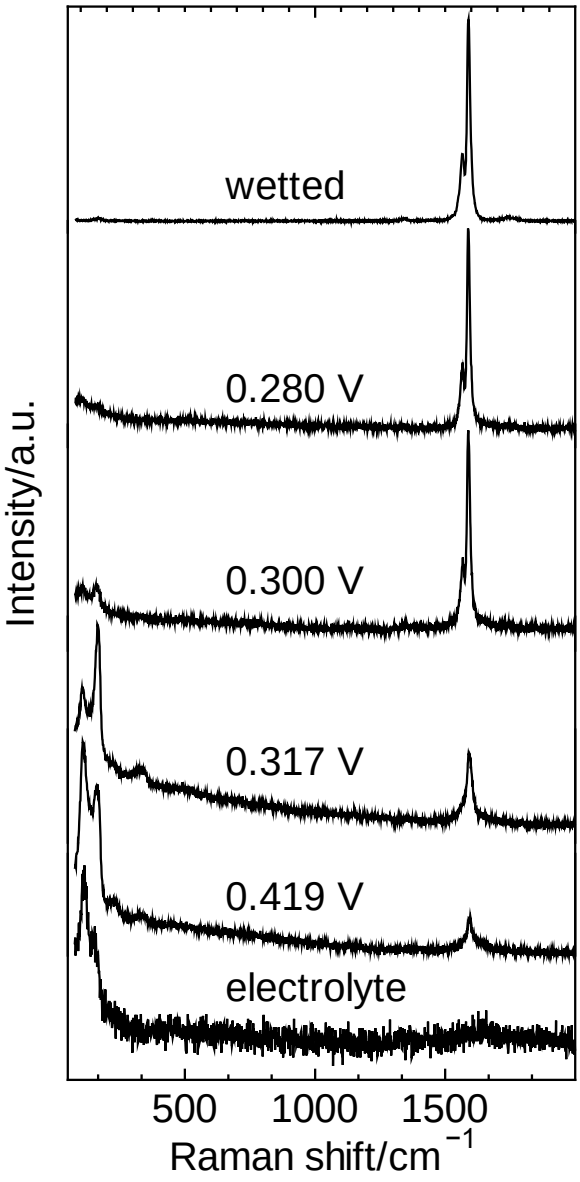

Fig. S4 In-situ Raman spectra at the various applied potential.

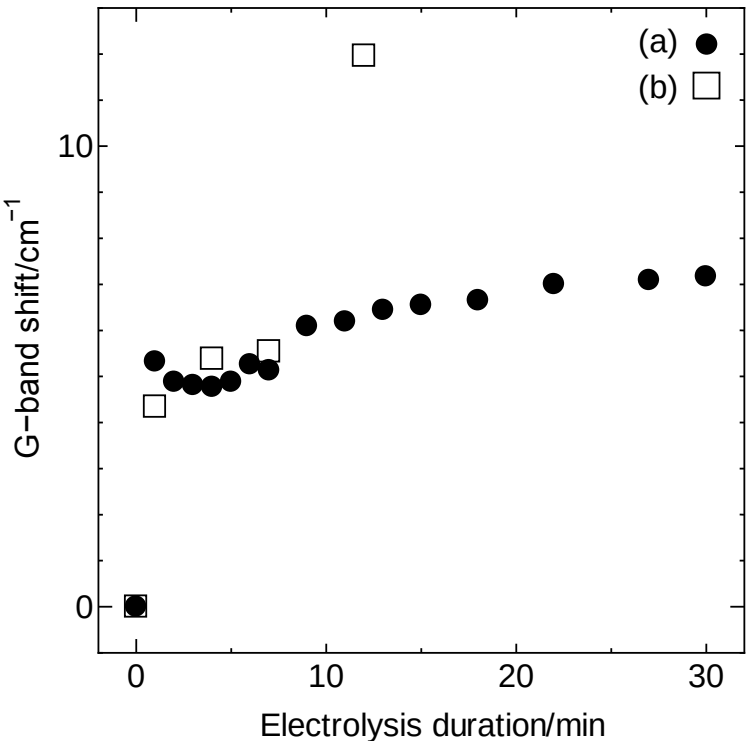

Fig. S5 G-band shift related to electrolysis duration observed by in-situ Raman study. Electrolytes used were neutral (a) and acidic (in HI) (b) aqueous NaI solutions.

Doping level can be controlled easily by tuning the reaction time. Fig. S3 shows the change of the G-band shift as a function of the electrolysis duration. In this in situ study, applied potential was fixed at 0.74 V to investigate the effect of reaction time for tuning doping level.

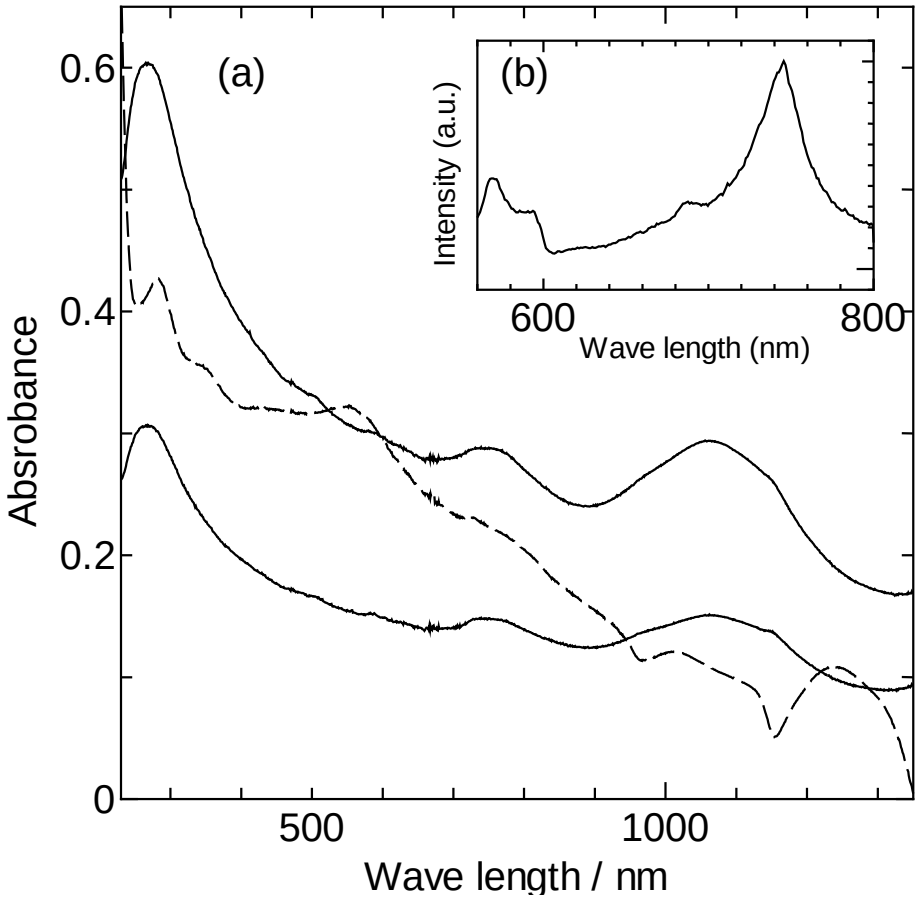

Fig. S6 UV-VIS absorbance of 10 μg/mL(top), 5 μg/mL(bottom) SWCNT:SDS aqueous solution(solid) and iodine doped SWCNT(dash) (a), photo luminescence spectrum of iodine doped SWCNT excited by 514.5 nm(b).