

## 密度勾配超遠心法による (6,5) カーボンナノチューブ選択単離 Selective Isolation of (6,5) Carbon Nanotubes by Density Gradient Ultracentrifugation

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We present a protocol to selectively isolate single-walled carbon nanotubes (SWNTs) with a chirality of (6,5) using density gradient ultracentrifugation (DGU)<sup>[1]</sup>. Starting with different pristine SWNTs, prepared by the CoMoCAT (Co-Mo catalytic process), HiPCO (high pressure CO disproportionation) and ACCVD (alcohol catalytic chemical vapor deposition) methods, we used *sodium deoxycholate* (DOC), *sodium dodecyl sulfate* (SDS) and *sodium cholate* (SC) as co-surfactant encapsulating agents<sup>[2]</sup> to selectively isolate (6,5) SWNTs. As shown in Figure 1, the optical absorbance spectra (left) and photoluminescence excitation (PLE) map (right) show that the resulting samples contain a high relative purity of (6,5) SWNTs, and that other chiralities were present at relatively low concentrations. Although different starting materials were used, the isolated (6,5) species showed the same optical properties. Nevertheless, a small amount of (8,3) SWNTs were also present. The PLE map in Fig. 1 shows the isolation of (6,5) SWNTs was obtained without iterations, illustrating the potential for complete isolation of different SWNT samples by DGU. We believe that by further refinement and improvement of this process, more chiralities can be isolated through iterations and adjusting the experimental parameters.

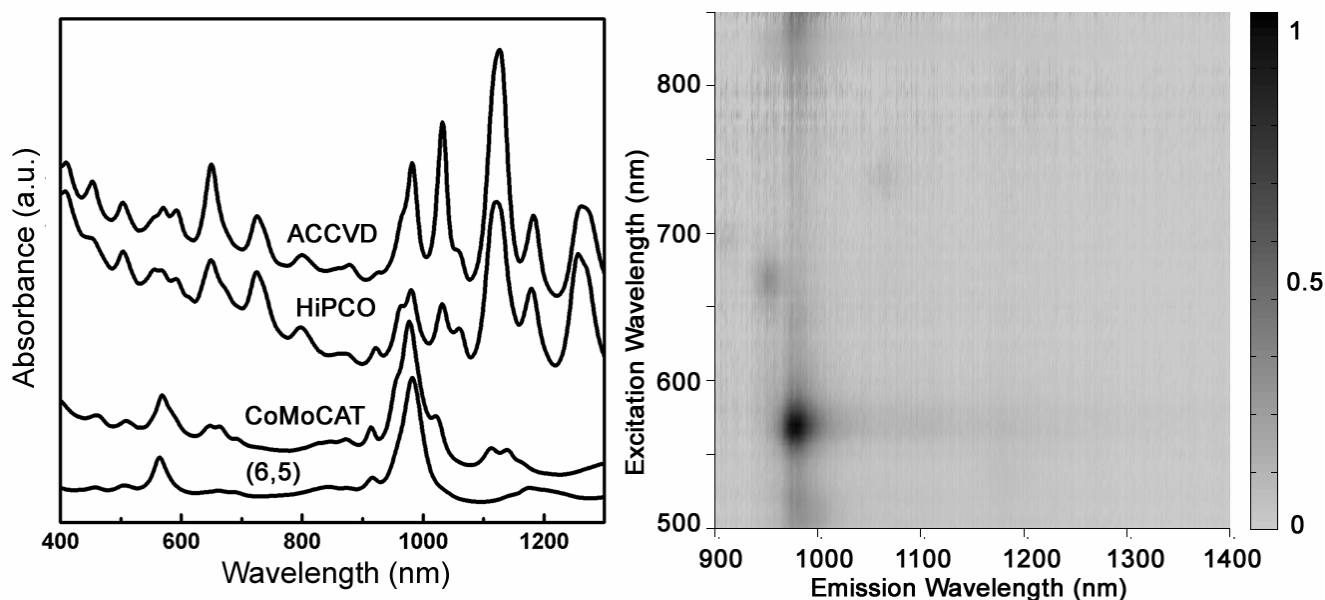


Figure 1: Optical absorbance spectra (left) and photoluminescence excitation maps (right) showing selective isolation of (6,5) SWNTs by density gradient ultracentrifugation of SWNTs prepared by various methods.

[1] M.S. Arnold, A.A. Green, J.F. Hulvat, S.I. Stupp and M.C. Hersam. *Nat. Nanotechnol.* **1**, 60 (2006).

[2] K. Yanagi, Y. Miyata and H. Kataura, *Appl. Phys. Express* **1**, 034003 (2008).