

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)^[1]. Starting with SWNTs synthesized by the alcohol catalytic chemical vapor deposition (ACCVD) method, we used *sodium deoxycholate* (DOC), *sodium dodecyl sulfate* (SDS) and *sodium cholate* (SC) as co-surfactant encapsulating agents^[2] to separate (6,5) SWNTs. The optical absorbance spectra and photoluminescence excitation (PLE) map (Fig. 1) show that the resulting sample contained a high relative purity of (6,5) SWNTs, but other chiralities were still present at low concentrations. After this initial separation, we refined the selectivity by iteration using the same DGU conditions. Evaluation by PLE showed an increasing concentration of (6,5) SWNTs after each iteration. The final (rightmost) PLE map shown in Fig. 1, showing isolation of (6,5) SWNTs, was obtained after three iterations. This illustrates the potential for complete isolation by DGU, and we believe that by further refinement of this process similar results can be obtained in a single step.

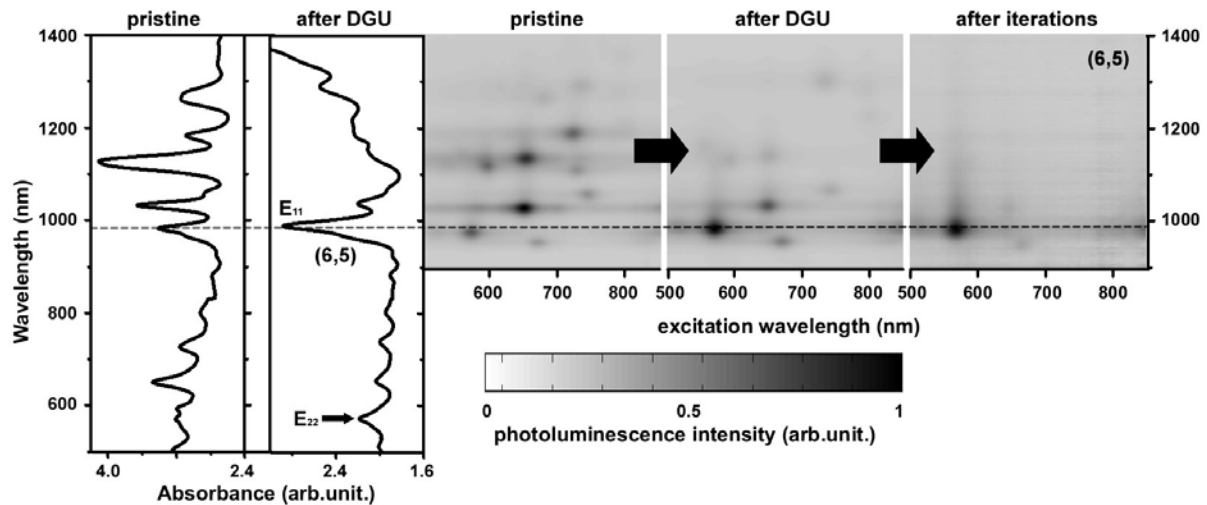


Figure 1: Optical absorbance spectra (left) and photoluminescence excitation maps (right) showing selective isolation of (6,5) SWNTs by iterated density gradient ultracentrifugation of ACCVD SWNTs.

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

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

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