

Electronic-type separation of single-walled carbon nanotubes by simple stamping process

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In this study, we investigated simple and scalable electronic-type separation of single-walled carbon nanotubes (SWNTs) by amine-functionalized polydimethylsiloxane (PDMS) stamp and demonstrated that high-yield SWNT separation is possible even with a single stamping process.

The HiPco SWNTs that are commercially produced are dispersed in an aqueous solution containing 1 wt% sodium dodecyl sulfate and arranged on a SiO<sub>2</sub>/Si substrate using alternating current (AC) dielectrophoresis. Then amine-functionalized PDMS was stamped on the substrate and removed. metallic SWNTs remain on the amine-functionalized PDMS and semiconducting SWNTs remain on the substrate. We find that negatively charged SDS predominately exists on metallic SWNTs rather than on semiconducting SWNTs, therefore it strongly combines with positively charged H atoms in amine groups on PDMS and separated together with amine-functionalized PDMS stamp. This method can be scaled-up and also applied to a variety of SWNTs