Separation of single-wall carbon nanotubes by dielectrophoresis in a microfluidic system

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Separation of single-wall carbon nanotubes (SWNTs) of different chirality has been a challenging problem since their discovery. Various methods of fractionation of SWNTs have been developed so far using, for instance, chemical functionalization, DNA, polymer wrapping, and density gradient ultracentrifugation techniques. One of them is a dielectrophoresis (DEP)-induced fractionation of metallic SWNTs from semiconducting SWNTs. In this work, DEP induced separation of SWNTs in the continuous microfluidic phase has been studied, since microfluidic system provides its advantages such as high throughput processibility, reduced reagent consumption, integration of several processes, and faster analysis or process time. Separation of SWNTs has been performed in the PDMS microfluidic devices. The separation results were characterized using Raman spectroscopy. During the separation, SWNTs were aligned with high regularity, which was observed by scanning electron microscope (SEM).