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Synthesis of strand type single-walled carbon nanotubes using H₂-Ar mixture gas by arc-discharge

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We studied the synthesis of strand-type single-walled carbon nanotubes(SWCNTs) using H₂-Ar mixture gases by electric arc-discharge methods. Iron was used as a single catalyst, and hydrogen and argon mixture gases were used as buffer gases in arc discharge. The morphology of SWCNTs was sensitively dependent on the pressure ratio between hydrogen and argon as the atmospheric gas. We could observe that as-synthesized strand-type SWCNTs were formed with some alignments through the SEM images. Moreover, the synthesis of SWCNTs using the mixture gases of hydrogen and argon as atmospheric gases in arc-discharge methods has the effect of increasing yields and the crystallinity of SWCNTs, compared with the synthesis using only hydrogen gas. The RAMAN and TEM studies show that As-synthesized strand-type SWCNTs have a distribution in the range from 1 to 1.5 nm and good crystallinity. Furthermore, we observed that the diameter of SWCNTs was changed from 1 to 2 nm by the mixture gas ratio.