

Article

High-Yield Synthesis of Helical Carbon Nanofibers Using Iron Oxide Fine Powder as a Catalyst

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Abstract: Carbon nanocoil (CNC), which is synthesized by a catalytic chemical vapor deposition (CCVD) method, has a coil diameter of 300–900 nm and a length of several tens of μm . Although it is very small, CNC is predicted to have a high mechanical strength and hence is expected to have a use in nanodevices such as electromagnetic wave absorbers and field emitters. For nanodevice applications, it is necessary to synthesize CNC in high yield and purity. In this study, we improved the conditions of catalytic layer formation and CCVD. Using optimized CVD conditions, a CNC layer with a thickness of $>40 \mu\text{m}$ was grown from a $\text{SnO}_2/\text{Fe}_2\text{O}_3/\text{SnO}_2$ catalyst on a substrate, and its purity increased to $81\% \pm 2\%$.

Keywords: carbon nanocoil; carbon nanomaterials; chemical vapor deposition; nanodevices; catalyst metals
