

Preparation of carbon nanocoils by the catalytic pyrolysis of acetylene and the properties

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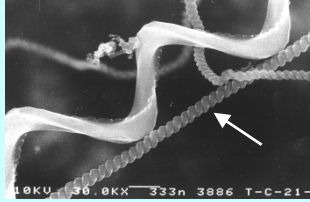
(Abstract) Carbon nanocoils with a 3D-helical/spiral structure and a coil diameter of several hundred to several ten nanometers were prepared by the Ni-catalyzed pyrolysis of acetylene. The preparation conditions, morphology, growth mechanism, microstructure and some properties were examined. Using fine powder of metals, ceramic powder-supported metals or sputtered metal thin films as the catalyst, carbon nanocoils as well as carbon microcoils were obtained. The carbon nanocoils were generally a single coil with the twisted form. The carbon coils could effectively absorb the magnetic waves of GHz region.



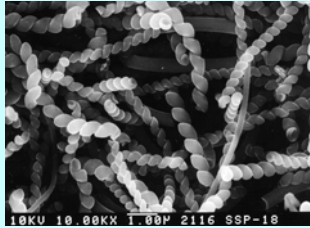
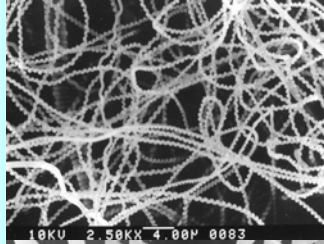
Carbon microcoils(1)



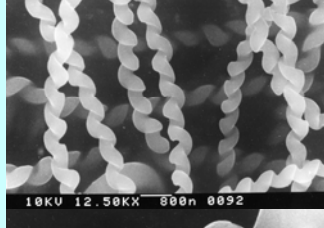
Carbon microcoils (2)



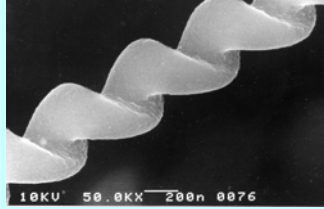
Carbon microcoils and nanocoils (arrow)



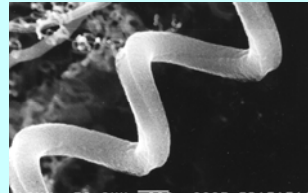
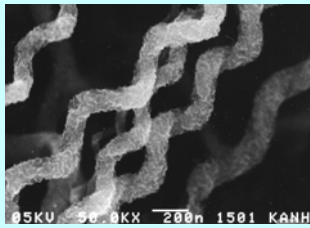
Carbon nanocoils



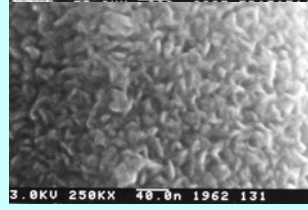
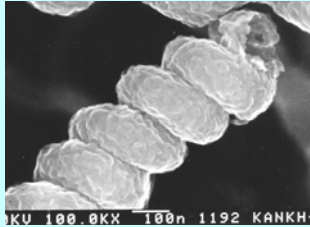
Double carbon nanocoils



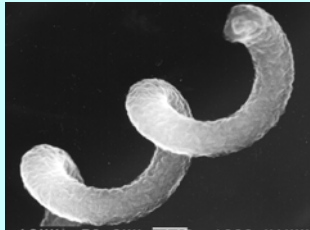
Twisted carbon nanocoils (Catalyst: Ni-Au)



Spring-like carbon nanocoils



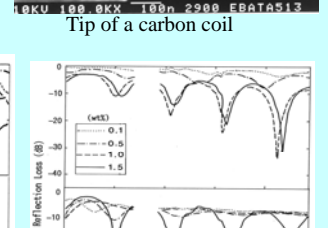
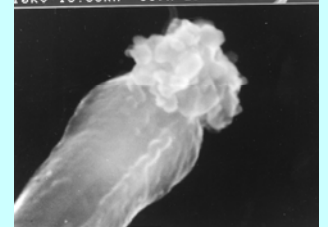
Straight fiber-twisted coil



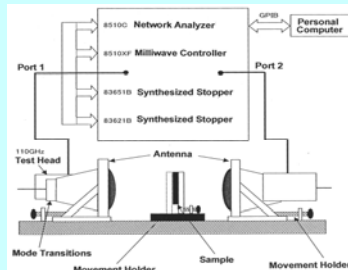
Carbon nanocoils with fringes



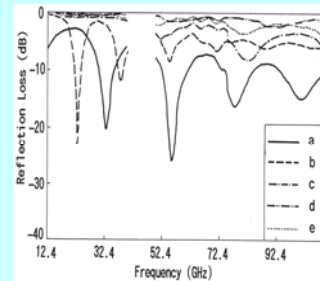
Tip of a carbon coil



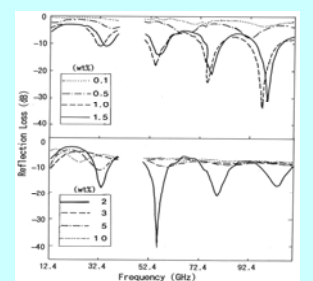
Raman spectra of the carbon coils obtained with the application of high magnetic field



Measurement apparatus of electromagnetic wave of GHz region



Reflection loss (1) (a) carbon coils, (b~d) carbon powders, (e) straight carbon fibers



Reflection loss (2)