Vapor phase preparation of carbon microcoils/nanocoils under concerted amplification of magnetic field and their properties

S. Motojima, K. Kuzuya, S. Yang, X. Chen, T. Hashishin[*1)], H. Iwanaga[*1)], S. Shimada[*2)] and H. Saito[*3)], N. Yoshikawa[*4)], T. Awaji[*5)], K. Watanabe[*5)]

Faculty of Engineering, Gifu University, Gifu 501-1193, Japan (e-mail: motojima@apchem.gifu-u.ac.jp),
[*1)] Faculty of Engineering, Nagasaki University, Nagasaki 852-8131, [*2)] Graduate School of Engineering, Hokkaido University, Sapporo 060-0813, Japan, [*3)] Faculty of Engineering, Nagaoka University of Technology, [*4)] Graduate School of Engineering, Tohoku University, Sendai 980-8579, Japan, [*4)] Institute of Materials Research, Tohoku University, Sendai 980-8577.

Carbon microcoils with a coil diameter of several microns were prepared by the catalytic pyrolysis of acetylene using the concerted amplification of a static high magnetic field (max. 5T). The effect of the magnetic field on the growth, morphology, growth mechanism and properties of the carbon coils were examined. The application of the magnetic field in the reaction atmosphere did not affect on the coil yield but did affect on the morphology and physical properties of the carbon coils. Many flat coils with a flat fiber cross section grew with application of the magnetic field. The density of the carbon coils increased from 1.80 m/cm3 without application of the magnetic field to 1.88 m/cm3 with application of 4~5T, and the crystallinity increased with the increasing magnetic flux density.