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Morphological Transformation of Copper Catalysts within Helically Coiled Carbon Nanofibers¹ LIFENG DONG, Missouri State University, LIYAN YU, QIAN ZHANG, Qingdao University of Science and Technology — With tailoring synthesis parameters, different carbon nanostructures including carbon nanotubes, carbon nanofibers, and graphene, can be synthesized using copper (Cu) as catalysts and acetylene as carbon source. Some remarkable progress has been made in synthesis techniques; however, pioneering breakthroughs have not been made yet in terms of growth mechanism, especially interactions between catalyst particles and acetylene molecules. In this study, the growth mechanism of helically coiled carbon nanofibers and morphological changes of Cu catalysts were investigated using a number of electron microscopy and microanalysis techniques, such as scanning electron microscopy (SEM), transmission electron microscopy (TEM), scanning transmission electron microscopy (STEM), and electron energy loss spectroscopy (EELS). Following the synthesis, single-crystal Cu particles deformed to small nanoparticles of cuprous oxide (Cu₂O) due to internal strain, and Cu₂O nanoparticles migrated within carbon nanofibers.

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