

## NEWS from ARO-FE (Apr 15, 2001)

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**Any Interest in: Carbon nanocoils?!**

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Here are the latest news from the Nikkei Sangyo Shimbun:

Osaka Prefecture University and Toyohashi University of Science & Technology independently developed carbon nanocoils in which carbon atoms are bonded in tubular form with a thickness of several nanometers. Applications include electron emitting elements used in flat type displays, springs of micromachines, medical devices that prevent the contraction of minute blood vessel, as well as the material for blocking the electromagnetic wave and gas absorber.

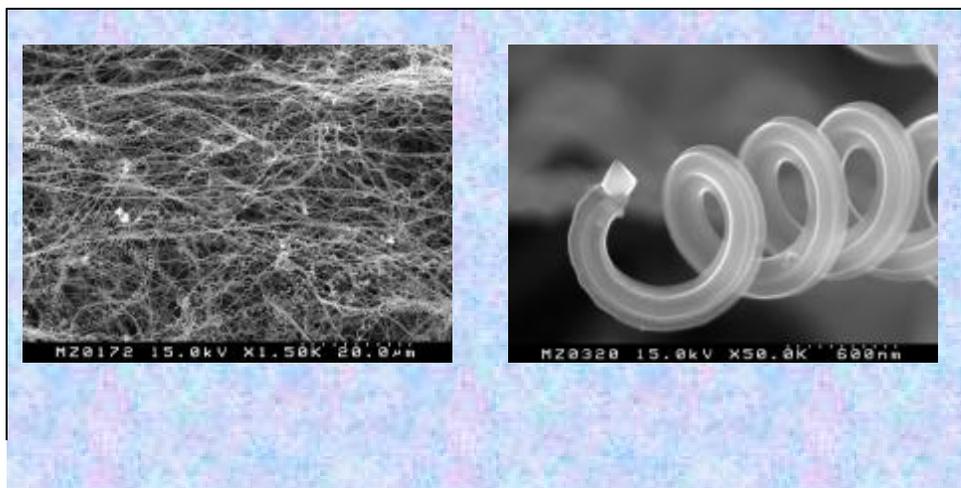
Two groups did trial manufacturing: (1) Prof. Nakayama of Osaka Prefecture University and Taiken Kagaku Kougyo Co., Ltd. and (2) Associate Professor Takigawa and Professor Sakakibara, Toyohashi Institute of Science & technology. Also, Futaba Electronic Industry was cooperating with the second group. The methods used by both groups were almost the same. The raw materials, gases of organic molecules at high temperatures, were reacted on the substrate having the catalytic property, resulting in the growth of the carbon nanocoil.

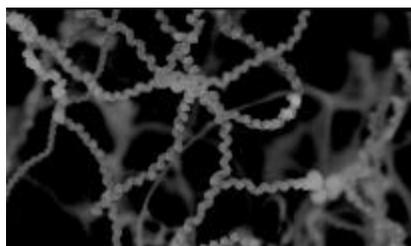
In Professor Nakayama's group, acetylene was blown on the substance composed indium and tin oxide on which iron film was deposited by electroplating, resulting in the growth of the coil. The reaction temperature was 650-680°C. The thickness of the nanocoils was 40-60 nanometers.

In Prof. Takigawa's group, the raw material was ethylene gas. The coils were fabricated on the substrate of copper on which nickel or zinc thin film was deposited by means of vacuum arc deposition. The reaction temperature was 650-750°C. More than 90 % of the reaction products were nanocoils (the selectivity was high). The thicknesses of these nanocoils were similar to the one obtained by Prof. Nakayama. The pitch of helix was ten to several hundred nanometers while the outer diameter was several nanometers, similar to the geometry of virus and bacterium.

Dr. Takigawa commented "the coil thus fabricated will be applied to the electron emitting material used in flat panel displays. Although some devices have already been developed using nanotubes, our nanocoils (synthesized at low temperatures) are more attractive because of their low fabrication cost and good selectivity."

*Upon request, ARO-FE will be pleased to obtain more information on these processes.*





Nano-Coil(s) from Dr. Takigawa of Toyohashi Institute of Science & Technology

Nano-Coils from Dr. Nakayama of Osaka Prefecture University