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A thermocouple-based remote temperature controller of an electrically floated sample to study plasma CVD growth of carbon nanotube TAKUYA MIURA, WEI XIE, TAKASHI YANASE, TARO NAGAHAMA, TOSHIHIRO SHIMADA, Faculty of Engineering, Hokkaido University — Plasma chemical vapor deposition (CVD) is now gathering attention from a novel viewpoint, because it is easy to combine plasma processes and electrochemistry by applying a bias voltage to the sample. In order to explore electrochemistry during the plasma CVD, the temperature of the sample must be controlled precisely. In traditional equipment, the sample temperature is measured by a radiation thermometer. Since emissivity of the sample surface changes in the course of the CVD growth, it is difficult to measure the exact temperature using the radiation thermometer. In this work, we developed new equipment to control the temperature of electrically floated samples by thermocouple with Wi-Fi transmission. The growth of the CNT was investigated using our plasma CVD equipment. We examined the temperature accuracy and stability controlled by the thermocouple with monitoring the radiation thermometer. We noticed that the thermocouple readings were stable, whereas the readings of the radiation thermometer changes significantly (20 °C) during plasma CVD. This result clearly shows that the sample temperature should be measured with direct connection. On the result of CVD experiment, different structures of carbon including CNT were obtained by changing the bias voltages.

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