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Radical density measurement in VHF C_2F_6/H_2 plasma used for carbon nanowall growth MINEO HIRAMATSU, SATORU KATO, Meijo University, HAJIME SASAKI, WAKANA TAKEUCHI, SHINGO KONDO, Nagoya University, KOJI YAMAKAWA, Katagiri Engineering, MASARU HORI, Nagoya University — Carbon nanowalls (CNWs), two-dimensional carbon nanostructures consisting of plane graphene layers standing on the substrate, have been grown recently. The large surface area and thin edges of CNWs would provide potential applications in energy storage, as electrodes for fuel cells and field emission display. The morphologies and growth rate of CNWs depend on the types of carbon source gases and the amount of H atoms injected. In this work, CNWs were fabricated using VHF C_2F_6 PECVD with H radical injection, which was developed for the large-area growth of CNWs with reasonable growth rate. This system consists of a parallel-plate VHF (100 MHz) capacitively coupled plasma (CCP) region and a surface wave microwave (2.45 GHz) excited H_2 plasma as a radical source. A carbon source gas (C_2F_6) was introduced into the VHF CCP region. By using this system, the heated substrate was showered with fluorocarbon radicals as well as plenty of H atoms in a controlled manner. Absolute H and C atom densities in the plasma were measured by vacuum ultraviolet absorption spectroscopy as functions of input power and pressure in order to investigate the growth mechanism of CNWs. The correlation between CNW growth and radical densities was discussed.

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