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Effects of Discharge Power on Deposition Cutoff of Carbon Nanoparticles Synthesized by High Pressure Ar+CH_4 Multi-hollow Discharge Plasma CVD[1] SUNGHWA HWANG, KUNIHIRO KAMATAKI, NAHO ITAGAKI, Kyushu University, KAZUNORI KOGA, Kyushu University, National Institutes of Natural Science, MASAHARU SHIRATANI, Kyushu University — Structure-controlled carbon nanomaterials reveal unique properties compared to those in bulk [1]. Among many processes that produce nanocarbon, plasma is a practical alternative that allows a simple and continuous fabrication. So far, we have succeeded in the synthesis and deposition control of spherical carbon nanoparticles (CNPs) of which sizes are between 250 and 25nm using a multi-hollow discharge plasma chemical vapor deposition (MHDPCVD) method [2]. To decrease the size of CNPs, the gas residence times in the plasma discharge region is reduced by increasing Ar+CH_4 gas flow rate from 10sccm to 200sccm at 2Torr. Above the high gas flow rate of 125sccm for the discharge power of 43W, no CNPs deposits on a substrate (Deposition cutoff). We employed the discharge power from 43 to 63W and confirmed that CNPs less than 15nm in size exist on a substrate over 125sccm. Therefore, the gas residence time and the discharge power are the key tuning knobs for their size and deposition control onto a substrate. [1] L. Xiao, et al., Nano Energy 19 (2016) 279. [2] M. Shiratani, et al., J. Phys. D44 (2011) 174038.

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