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Structure control of self-supporting graphene nanowalls synthesized by plasma enhanced chemical vapor deposition KEIGO TAKEDA, MOTOAKI ISHIKAWA, MINEO HIRAMATSU, Meijo Univ, HIROKI KONDO, MASARU HORI, Nagoya Univ — Carbon nanowalls (CNWs) composed of few-layer graphenes grown vertically on a substrate form self-supporting network of walls. The large surface area of conductive carbon with high chemical and physical stability is useful for electrochemical applications, such as sensing, rechargeable battery cell, etc. For achieving such applications, the structure control of CNWs is one of crucial issues. The structure of CNWs is considered to depend on the surface density of nucleation on the substrate in the initial growth of CNWs. In this study, the CNWs growth was carried out using two-step plasma CVD process with different conditions for the initial growth of CNWs as a template and the subsequent vertical growth after the initial growth. The CNWs were grown on a Si substrate by an inductively coupled methane/Ar plasma CVD. As results, surface morphology and crystallinity of grown CNWs became denser and lower with increase in the Ar flow rate ratio of methane/Ar mixture. However, by reducing the Ar flow rate ratio after the initial growth under the high Ar flow rate ratio condition, vertical-grown CNWs with relatively large interspace between adjacent nanowalls could be synthesized with high crystallinity.

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