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Growth of graphene-based films using afterglow of inductively coupled plasma MINEO HIRAMATSU, MASAKAZU TOMATSU, Meijo University, HIROKI KONDO, MASARU HORI, Nagoya University — Plasma-enhanced CVD (PECVD) employing methane/hydrogen gases has been used to grow diamond and carbon nanostructures. In the case of graphene growth using PECVD, excessive supply of carbon precursors and ion bombardment on the growing surface would cause secondary nuclei, resulting in small size of graphene grain and degradation in crystallinity. To overcome this issue, in this work, afterglow of inductively coupled plasma (ICP) was used for the growth of graphene. The CVD system is simple and consists of a reaction chamber and a remote radical source that uses an ICP in cylindrical geometry. Methane/hydrogen gases were fed through a quartz tube of 26 mm inner diameter and 20 cm in length. A five-turn rf (13.56 MHz) coil was mounted on the quartz tube. Substrates (Ni-coated Si and Cu foil) were located in the afterglow region of ICP. Growth experiments were carried out for 1-10 min at temperature of 700 C, rf power of 400 W, and total pressure of 100 mTorr. We have successfully fabricated graphene-based films, which was confirmed by the Raman spectrum and SEM image of deposit. We will discuss the planar graphene growth mechanism in terms of precursors and their surface reaction, in conjunction with the growth experiments using microwave plasma and ICP in planar geometry.

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