

Graphene synthesis on Cu metallic substrate using DC magnetron sputtering method

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Abstract

Sputtering is a deposition method widely used industrially because it allows large areas. Papers on the synthesis of graphene thin films using the sputtering method are very rare [1-2]. Research was conducted to apply the sputtering deposition method to graphene synthesis. The substrate was one with the (111) crystal plane oriented in the vertical direction of the substrate. The sputtering target used was graphite. The substrate was placed in a vacuum chamber and pumped down to 1×10^{-6} Torr. Subsequently, the temperature of the substrate was increased to 500 degrees Celsius. The graphene deposition was carried out at varying distances between the substrate and the sputtering target: 1 cm, 3 cm, 5 cm, and 7 cm. Other deposition conditions remained constant, specifically an argon partial pressure of 5 mTorr, a discharge current of 0.8 A, and a discharge voltage of 750 V. Raman analysis of the graphene thin films showed that the $I(2D)/I(G)$ ratio increased as the distance between the substrate and the sputtering target decreased. This indicates that the geometric arrangement of the target and substrate critically influences the quality of the graphene films synthesized.

References

[1] Yoshiki Nakajima, Hiromasa Murata, Noriyuki Saitoh, Noriko Yoshizawa, Takashi Suemasu,† and Kaoru Toko, ACS Omega, Vol.4 (2019) 6677-6680.

[2] Mihnea Ioan Ionescu, Xueliang Sun, and Ben Luan, Can. J. Chem., Vol. 93 (2015) 160-164

Figures

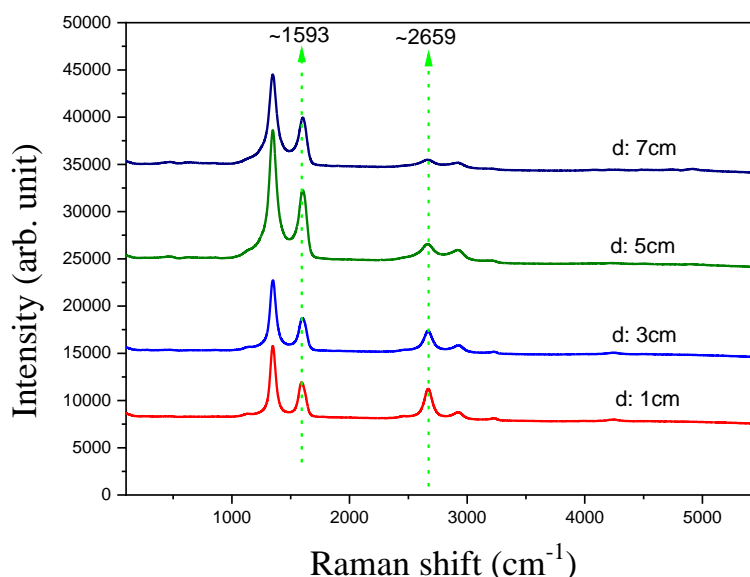


Figure 1: Raman analysis results based on the distance between the target and the substrate