Flame Synthesis of Graphene Layers at Low Pressure

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Abstract—The synthesis of graphene layers on a nickel substrate in a butane–benzene–oxygen premixed flame at a pressure of 40–100 Torr is studied. It is demonstrated that, the temperature of 900–950°C and exposure time of 0.5 min are sufficient for synthesizing graphene layers on a nickel substrate. It is shown that, at a pressure of 45–55 Torr, single layer graphene is predominantly formed. It is found that, at a pressure of 90 Torr and an exposure time of 0.5 min, monolayer graphite can be produced, but with a lower yield as com pared to that prepared at 45–55 Torr. It is demonstrated that the degree of defectiveness of graphenes decreases with the exposure time, reaching a minimum value of I_D/I_G = 0.36.
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