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Low-Temperature Plasma Enhanced Chemical Vapor Deposition Process for Growth of Graphene on Copper

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Graphene, sp^2-hybridized 2-Dimension carbon material, has drawn enormous attention due to its desirable performance of excellent properties. Graphene can be applied for many electronic devices such as field-effect transistors (FETs), touch screen, solar cells. Furthermore, indium tin oxide (ITO) is commercially used and sets the standard for transparent electrode. However, ITO has certain limitations, such as increasing cost due to indium scarcity, instability in acid and basic environments, high surface roughness and brittle. Due to those reasons, graphene will be a perfect substitute as a transparent electrode. We report the graphene synthesized by inductive coupled plasma enhanced chemical vapor deposition (ICP-PECVD) process on Cu substrate. The growth was carried out using low temperature at 400^{o}C rather than typical chemical vapor deposition (CVD) process at 1,000^{o}C The low-temperature process has advantage of low cost and also low melting point materials will be available to synthesize graphene as substrate, but the drawback is low quality. To improve the quality, the factor affect the quality of graphene was be investigated by changing the plasma power, the flow rate of precursors, the scenario of precursors. Then, graphene film's quality was investigated with Raman spectroscopy and sheet resistance and optical emission spectroscopy.

Keywords: Graphene, PECVD, Low-temperature process