

Investigating graphene growth by Plasma-enhanced CVD using various catalyst thicknesses

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Graphene as 2D material with extraordinary properties has attracted the interest of research communities to master the synthesis at a large scale without sacrificing the quality. Plasma-enhanced chemical vapor deposition (PECVD) has attracted more and more attention as a promising method for controllable graphene synthesis. In this research, we report the correlation between the thickness variations of the Nickel as catalyst film and the quality of deposited Graphene using Quartz as substrate. Surface morphology was studied by atomic force microscopy (AFM). Raman spectroscopy was used to investigate the quality of graphene. The results showed that graphene samples deposited on nickel films of 40 and 70 nm thickness possess best quality.

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FIGURES

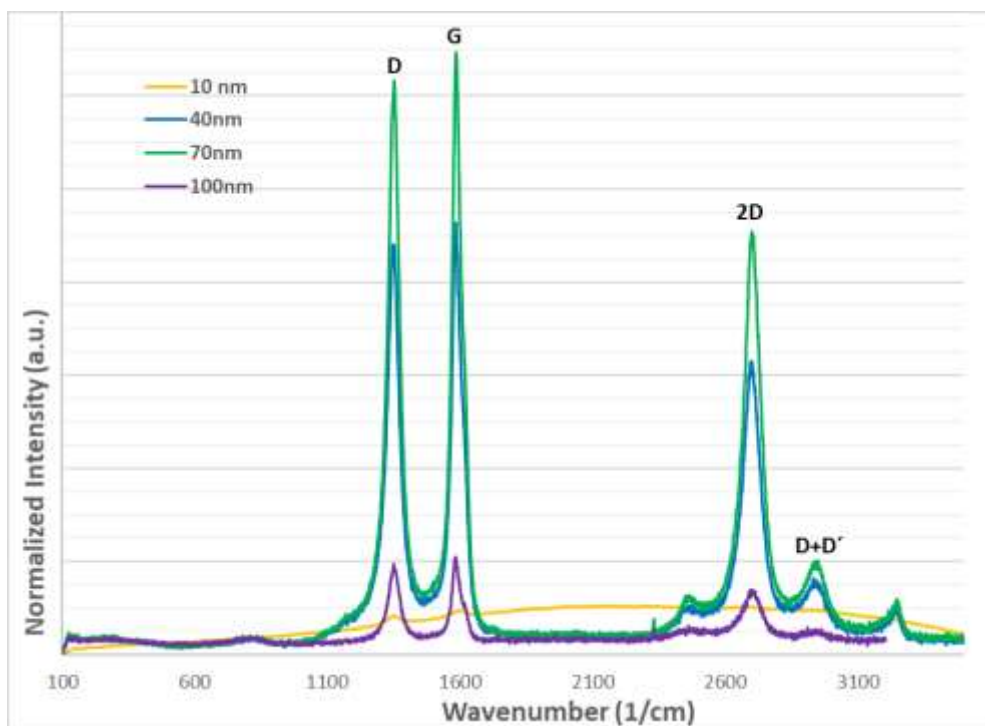


Figure 1: Raman spectra of graphene deposited on nickel of various thicknesses (10,40,70 and 100 nanometer) by PECVD consist of G (1580 cm⁻¹), 2D (2690 cm⁻¹), D (1350 cm⁻¹) and D+D'

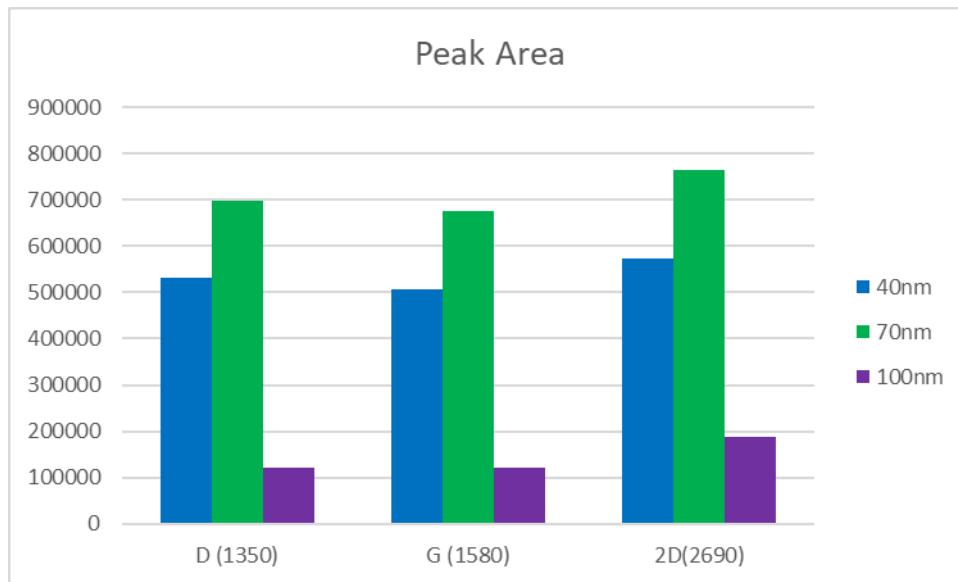


Figure 2: Comparison of area under D, G and 2D peaks of Graphene with different thicknesses

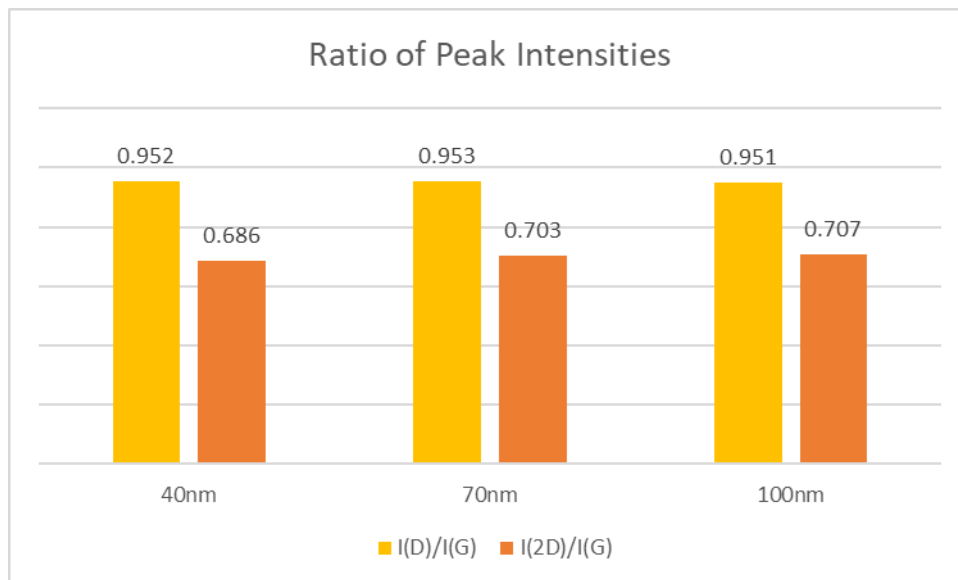
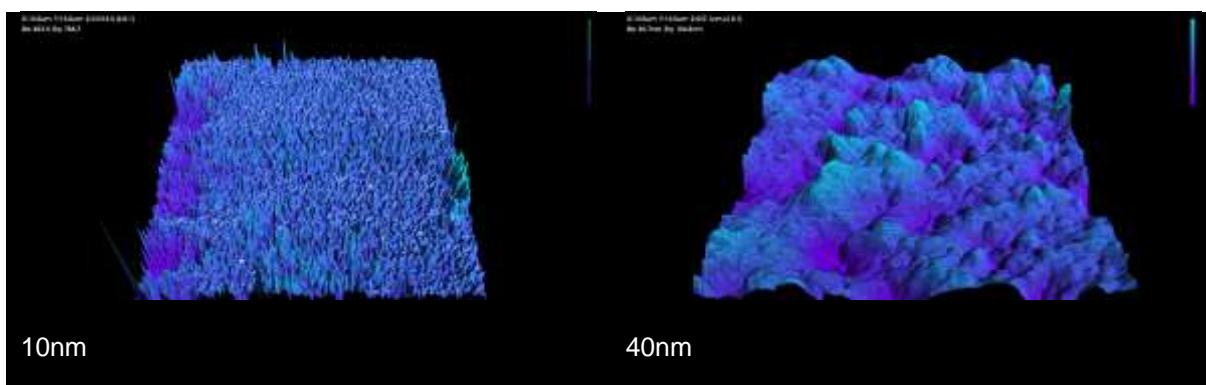


Figure 3: Proportion of intensities (D, G and 2D peak of Graphene growth by PECVD)



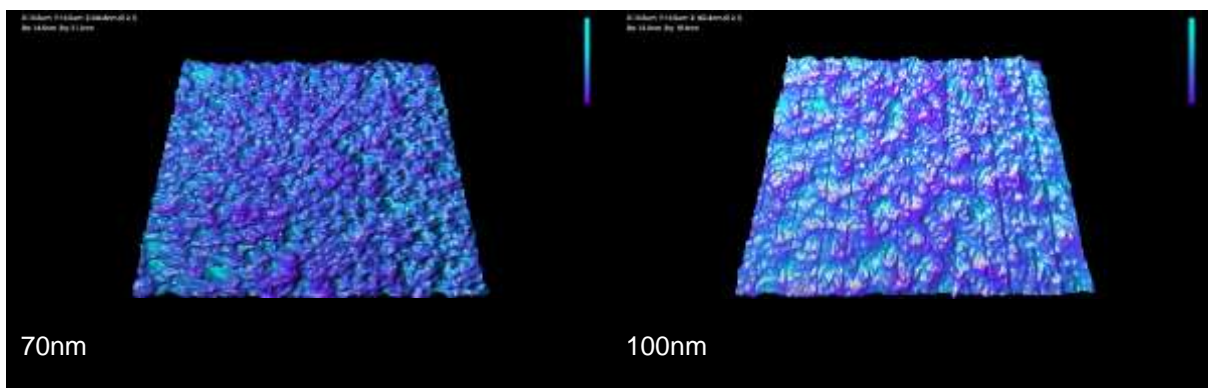


Figure 4: AFM images of graphene after growth on Quartz substrate including nickel (10, 40, 70 and 100) as a catalyst