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The study of direct growth of Graphene on SiO₂ using PECVD for FETs Bio Sensors

The development of high-performance biosensors is essential for advancing medical diagnostics and point-of-care testing. In this study, direct graphene growth was investigated using plasma-enhanced chemical vapor deposition (PECVD) on thermally oxidized SiO₂ substrates, with emphasis on the influence of oxide thickness and pre-annealing of substrates on graphene formation. This transfer-free approach preserves material integrity and minimizes contamination associated with conventional transfer processes. PECVD enables low-temperature, catalyst-free graphene synthesis directly on dielectric substrates, thereby improving compatibility with integrated and flexible biosensing platforms. By study of pre-annealing a few-layer nanocrystalline graphene films were synthesized on 100 nm and 300 nm SiO₂ layers. Raman spectroscopy, SEM, and FTIR confirmed the structural quality, surface morphology, and chemical composition of graphene. The resulting PECVD-grown graphene platform shows strong potential for stable, real-time, and label-free biosensing applications in next-generation diagnostic technologies.

References

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Figures

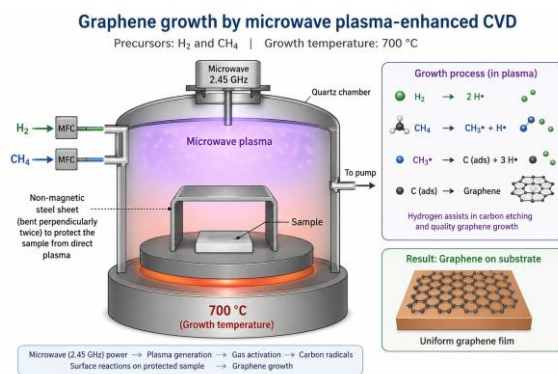


Figure 1: MW-PECVD direct synthesis of graphene on SiO₂