Contribution ID: **29** Type: **Invited Oral**

Microwave and RF Plasma Enhanced Synthesis of Nanomaterials

Thursday, 21 September 2023 11:35 (30 minutes)

Microwave Plasma and Radio Frequency (RF) Plasma are widely utilized plasma techniques for fabricating nano materials with tailored properties to suit specific applications. RF Plasma Enhanced Chemical Vapor Deposition (PECVD) is commonly employed for producing carbon nanomaterials, such as vertical graphene, which possesses desired defects for specific applications. By adopting PECVD, significant reductions in fabrication temperature can be achieved, although external heating and vacuum conditions are still necessary. On the other hand, Microwave Plasma enable graphene fabrication under ambient conditions and in larger quantities. Moreover, Microwave Plasma simplifies the complex multi-step processes involved in producing graphene oxide or doped graphene. These plasma techniques not only reduce energy consumption and costs compared to traditional methods but also offer the flexibility to utilize various carbon sources and substrates, broadening the potential applications of plasma-assisted graphene fabrication. The unique properties of graphene produced through microwave and RF plasma techniques open up numerous opportunities for diverse and high-value applications in electronics, energy storage, sensors, and other fields.

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Session Classification: Atmospheric Pressure Plasma

Track Classification: Atmospheric Pressure Plasma