

# Plasma Treatments to Forming Metal Contacts in Graphene FET

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Graphene formed by chemical vapor deposition was exposed to the various plasmas of Ar, O<sub>2</sub>, N<sub>2</sub>, and H<sub>2</sub> to examine its effects on the bonding properties of graphene to metal. Upon the Ar plasma exposure of patterned graphene, the subsequently deposited metal electrodes remained intact, enabling successful fabrication of field effect transistor (FET) arrays. The effects of enhancing adhesion between graphene and metals were more evident from O<sub>2</sub> plasmas than Ar, N<sub>2</sub>, and H<sub>2</sub> plasmas, suggesting that chemical reaction of O radicals induces hydrophilic property of graphene more effectively than chemical reaction of H and N radicals and physical bombardment of Ar ions. From the electrical measurements (drain current vs. gate voltage) of field effect transistors before and after Ar plasma exposure, it was confirmed that the plasma treatment is very effective in controlling bonding properties of graphene to metals accurately without requiring buffer layers.

**Keywords:** Graphene, plasma treatment, electrode, bonding energy, field effect transistor