# Deposition of Graphene-like coatings using modified, magnetic filtered high current arc evaporation for a high photocurrent generation by graphene/π-system/PSI-based electrodes

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Here, we present a new magnetic filtered high current arc evaporation process (Φ-HCA, Figure 1) for Graphene-like, transparent and conductive coatings on arbitrary substrates. This Φ-HCA process does not require any catalytic metal or thin metal film. The resulting coating was characterized using scanning tunnelling microscopy, transmission electron microscopy, and high resolution Raman microscopy. The Graphene-like carbon layers have a surface resistance of $6*10^3$ $\Omega_{sqr}$ and the optical transparency of the coatings is 92% with an excellent homogeneity [1]. This coating was used to fabricate a highly efficient graphene-based photobiohybrid light-harvesting electrode consisting of trimeric Photosystem I (PSI) supercomplexes immobilized onto π-system-modified graphene electrodes [2, Figure 2]. This biohybrid electrode displays a very high photocurrent output of 23 $\mu A*cm^2$ already at its open circuit potential. Additionally, the hybrid electrodes display a nearly unidirectional photocurrent generation, which can pave the way to produce next-generation photovoltaic devices.

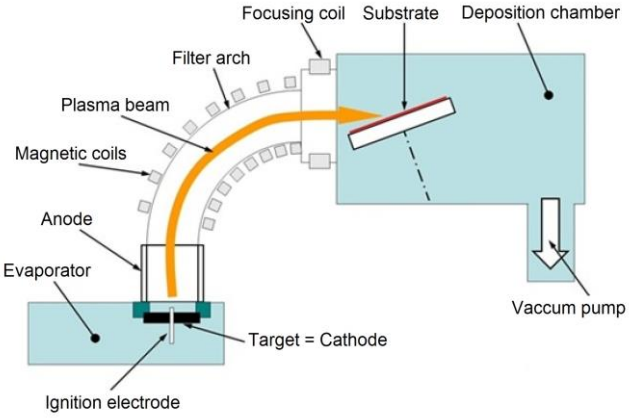


**Figure 1:** Schematic of a modified, magnetic filtered high current arc evaporation system for the deposition of Graphene-like, transparent conductive coatings on arbitrary substrates [1]

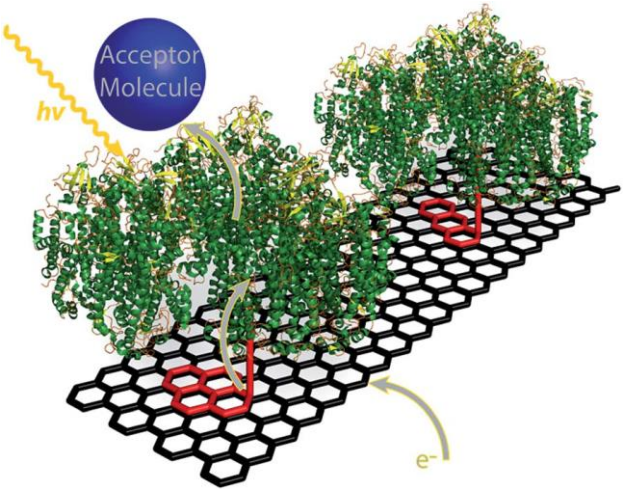


**Figure 2:** Schematic depiction of a graphene/π-system/PSI-based hybrid electrode. Arrows indicate the electron flow through this architecture [2].

References

[1] H. Lux et al., J. Appl. Phys., 117 (2015), 195304.
[2] S. C. Feifel et al., J. Mater. Chem. A, 3 (2015), 12188.

Figures