

A reusable edge-enhanced graphene quantum capacitor biosensor

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Abstract

A key challenge in graphene sensors is to restore the chemistry of the basal plane after its functionalization and use. Here, we show that protecting the basal plane in an edge-based graphene quantum capacitor (GQC) biosensor yielded a selective sensitivity and reusability for up to 30 cycles without substantial loss of performances. The possibility to restore the sensing area was achieved using an oxygen plasma treatment without affecting much the basal plane, protected by a ceramic material. By further functionalizing the graphene edges via NHS-diazonium chemistry, we could detect the binding of specific DNA strands by measuring variations in the quantum capacitance of graphene edges, facilitating selective sensing.[1]

References

[1] Yujia Huang et al, Materials Today, Volume 73, March–April 2024, Pages 38-46

Figures

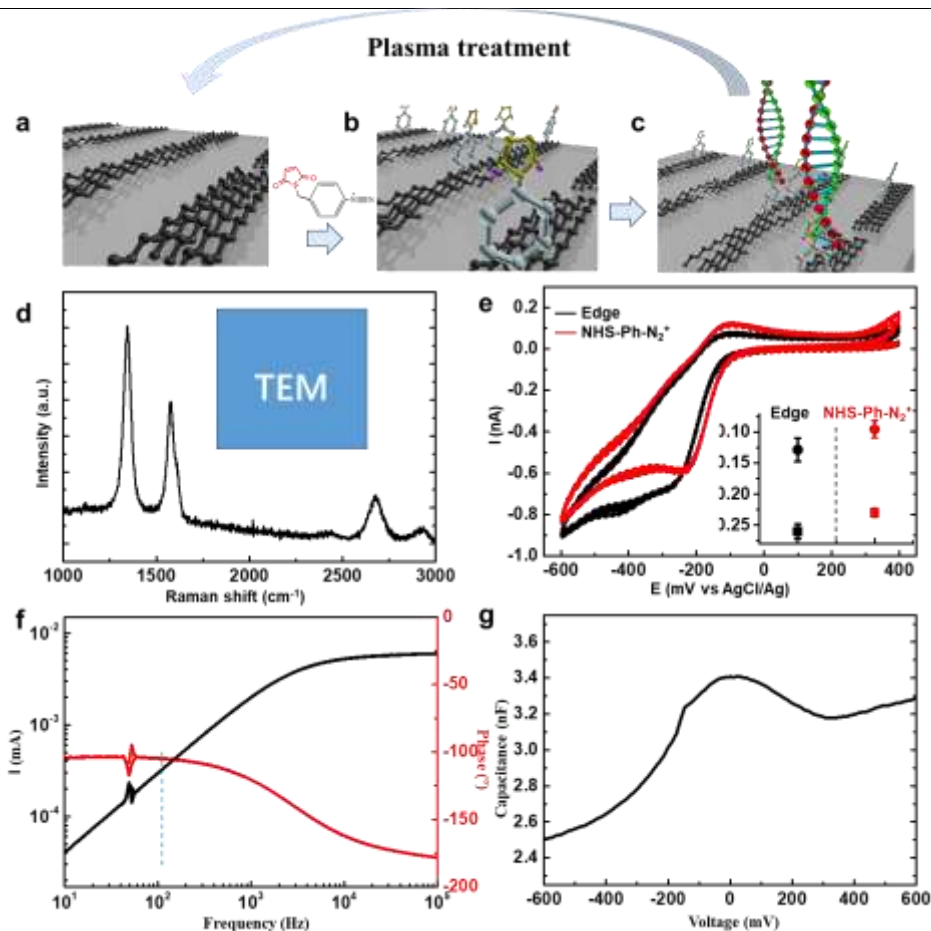


Figure 1: Schematic of a regenerate graphene edge biosensor.