Graphene-based biosensor for early detection of iron deficiency

Oluwadamilola Oshin [1,*], Dmitry Kireev [2,3], Hanna Hlukhova [4], Francis Idachaba [1], Deji Akinwande[2,3] and Aderemi Atayero [1]

[1] Electrical and Information Engineering Department, Covenant University, Ota, Nigeria
[2] Department of Electrical and Computer Engineering, The University of Texas at Austin, USA
[3] Microelectronics Research Center, The University of Texas at Austin, USA
[4] Institute of Complex Systems (ICS-8), Forschungszentrum Juelich, Germany
* Correspondence: damilola.adu@covenantuniversity.edu.ng

Supplementary Information

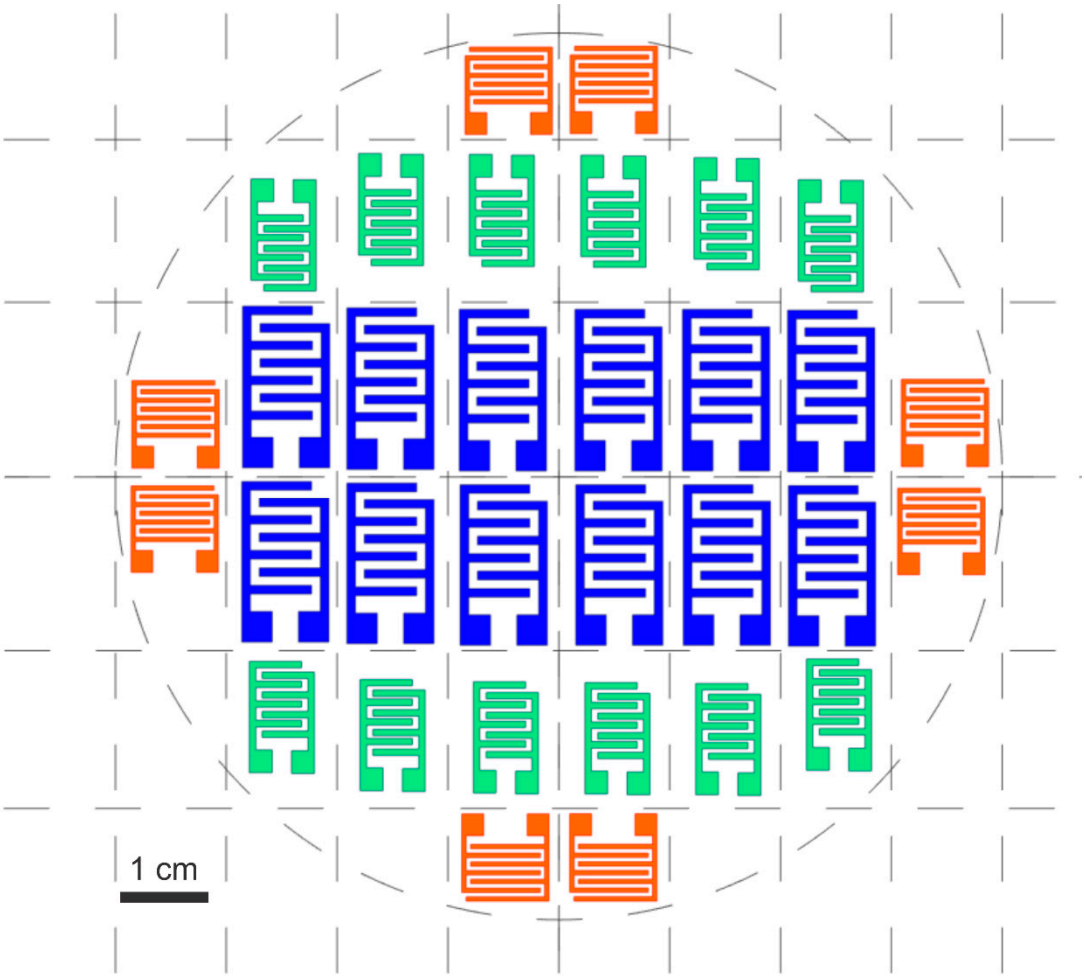

Figure S1: The IDE shadow mask pattern design specific for 4-inch wafer used in this work.

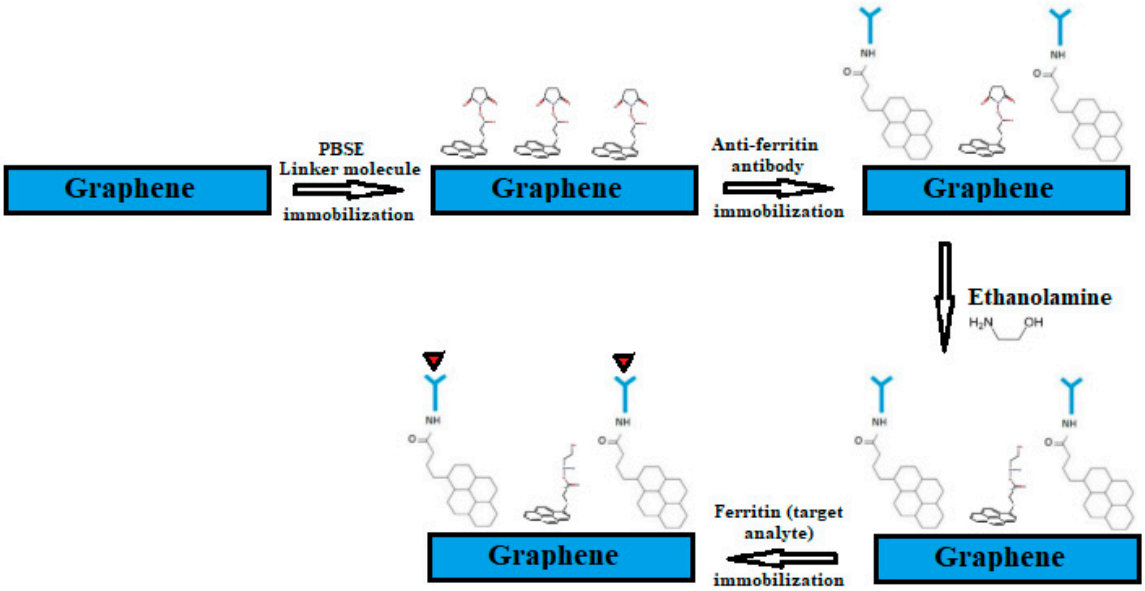

Figure S2: GFET functionalization process.

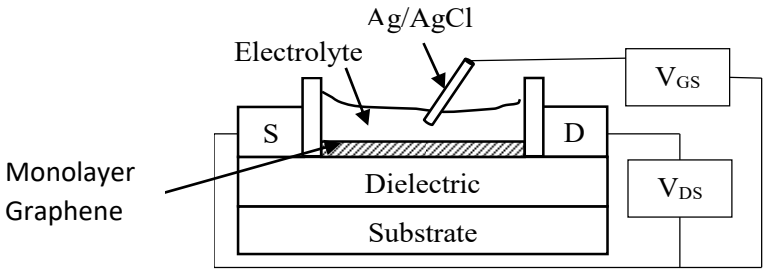

Figure S3: Liquid-gated FET Setup.

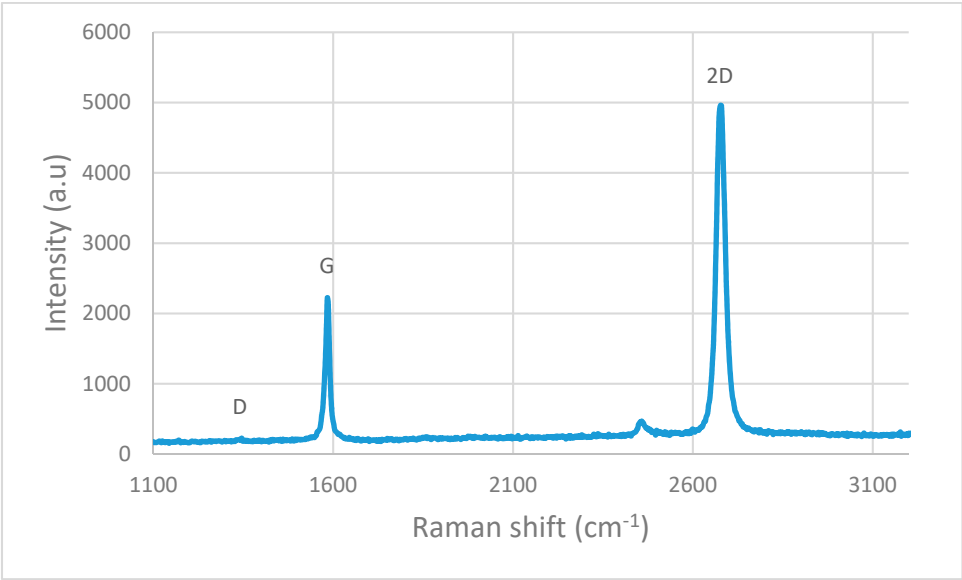

Figure S4: Raman shift for CVD-synthesized monolayer graphene.

Table S1: Ferritin concentration and the equivalent bound fraction.

Ferritin Antigen, $c_{F,n}$		**Bound Fraction, B_f**
10 pg/mL	21.1 fM	0.174
100 pg/mL	210.97 fM	0.678
1 ng/mL	2.11 pM	0.955
3.6 ng/mL	7.59 pM	0.987
6.18 ng/mL	13.04 pM	0.9923
8 ng/mL	16.88 pM	0.99411

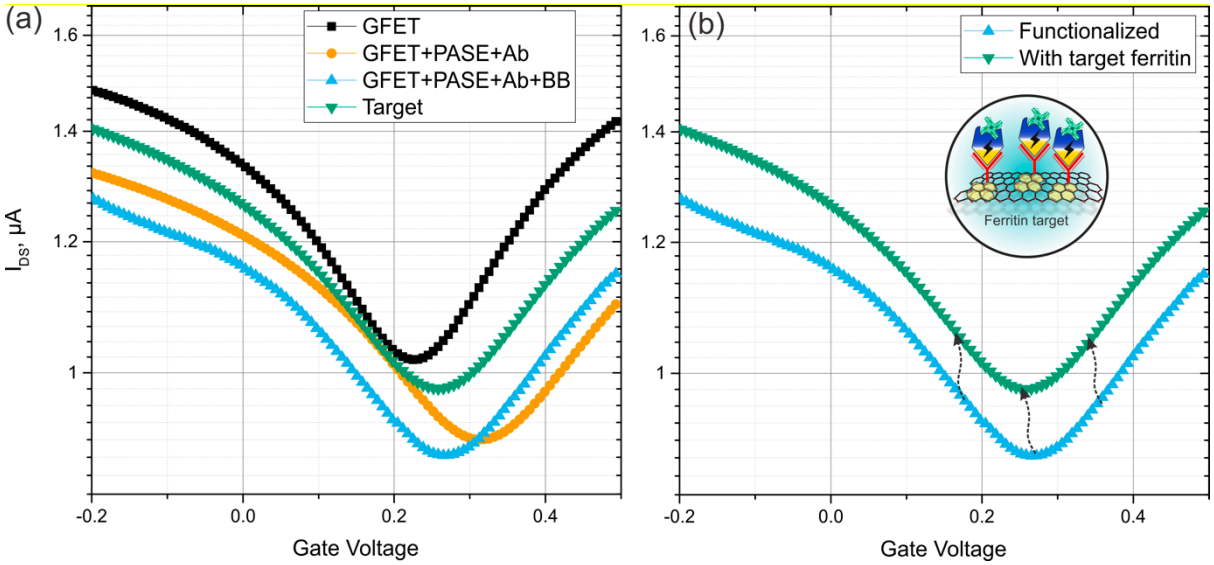

Figure S5. Shift of I-V curve upon different stages of functionalization of another device (#7). (a) Shows initial I-V curve, as well as upon functionalization with PASE + antibody, passivation, and addition of target ferritin biomolecule of 8 ng/mL concentration. (b) Shows the change in the I-V curve upon final step, of addition of specific ferritin biomolecules.