

Graphene-Based Electrochromic Devices

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Abstract: Electrochromic[1] devices provide the ability to modulate their optical response to photons in response to an external electrical stimulus. Here a monolayer CVD graphene based thin film electrochromic device was fabricated using a solid-state electrolyte[2] with a high Electric Double Layer(EDL) gating capacitance in the region of microFarads per cm^2 , the structure of EDLs is illustrated in Figure.1a. The device functions based off the Pauli blocking principle which is illustrated in Figure.1b and is shown to have meaningful optical modulation of signals of up to 1% in the mid-infrared region. Such performance shows promise for applications in technologies like active thermal camouflage[3], electronically controlled house insulation, smart clothing, radiative computer cooling systems and much more.

References

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- [3] Salihoglu, O., Burkay Uzlu, H., Yakar, O., Aas, S., Balci, O., Kakenov, N., Balci, S., Olcum, S., Suzer, S., & Kocabas, C. (2018), Nano Letters, 18(7), 4541-4548

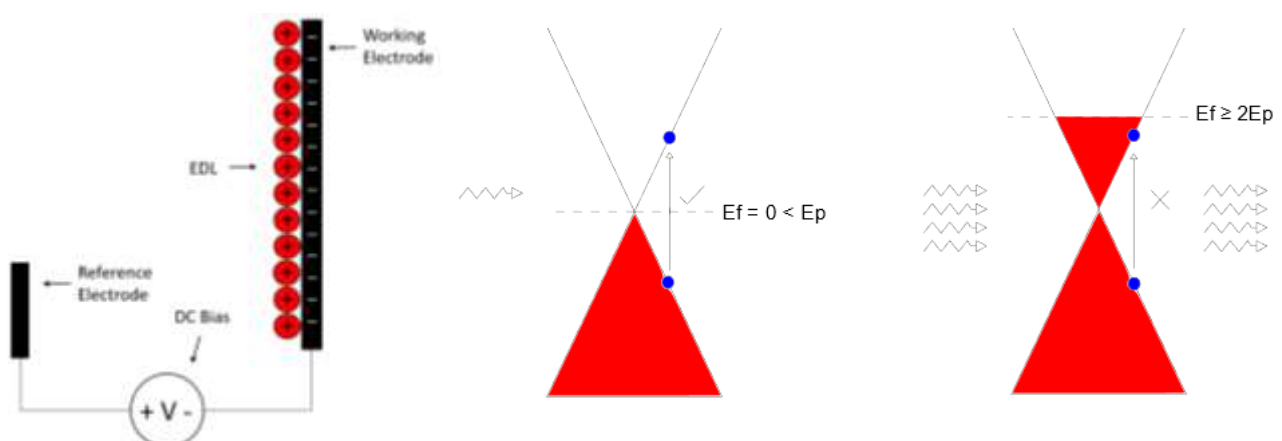


Figure 1: a) The formation of a EDL of ions in response to an externally applied electric field. b) The Pauli blocking effect occurring in response to a change in the Fermi energy level of the graphene.