GrapheneforUS

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Multilayer Graphene as Adaptive Thermal Camouflage

In this work we explore the use of multi-layer graphene (MLG) films grown by chemical vapor deposition for adaptive thermal camouflage. Using different ionic liquids, we tune the opto-electronic properties of MLG (150 – 200 layers) and investigate changes in optical reflectivity and emissivity in the infrared region (IR). We fabricate devices having a metallic back electrode supporting a porous membrane onto which we deposit the MLG as shown in Figure 1. We use both non-stretchable polyethylene (PE), and stretchable polydimethylsiloxane (PDMS) as porous membranes. Using a thermal imaging system, we demonstrate that even when the device temperature is maintained higher than the environment, the MLG emissivity can be electrically controlled such that the device appears indistinguishable from the environment [1]. Moreover, we evaluate the performance of such devices based on flexible textiles towards developing a new material platform for defense applications.

References

[1] Omer Salihoglu, Hasan Burkay Uzlu, Ozan Yakar, Shahnaz Aas, Osman Balci, Nurbek Kakenov, Sinan Balci, Selim Olcum, Sefik Süzer, and Coskun Kocabas, Nano Letters, 18, 7, (2018), 4541

Figure

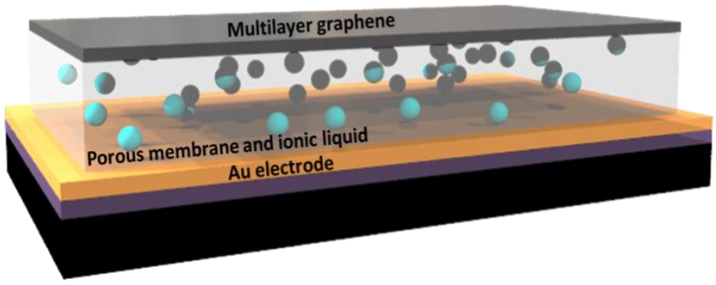

Figure 1: Schematic of the Adaptive Thermal-Camouflage Device.