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Article

Ambipolar to Unipolar Conversion in C_{70}/Ferrocene Nanosheet Field-Effect Transistors

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Supporting Infromation

1. Experimental Details

The C_{70}/Fc nanosheets were synthesized following the method described in the literature [1]. Firstly, a toluene solution was prepared and saturated with C_{70}. Afterward, the solution underwent filtration to eliminate any remaining undissolved C_{70} powder. Following that, ferrocene powder was introduced into the C_{70}-saturated toluene solution, which was subsequently ultrasonicated in an ice water bath. In a gradual manner, IPA was gently added to the toluene solution, and the resulting mixture was manually shaken. The resulting mixture was then stored at room temperature for a duration of 24 hours, facilitating the growth of C_{70} /Fc nanosheets. The nanosheets obtained in this study were thoroughly characterized. Visible/near infrared diffuse reflectance spectroscopy was utilized to investigate the optical properties of the nanosheets. The Photoacoustic Yield Spectrum Analysis (PYSA) was performed using the advanced RIKEN KEIKI AC-3 system, equipped with a monochromated D2 lamp. These comprehensive characterization techniques provide valuable information about the nanosheets, contributing to a better understanding of their potential applications.

2. Fabrication of FET devices

The fabrication process of the FET (Field-Effect Transistor) devices involved depositing solutions of C_{70}/Fc nanosheets onto prepatterned substrates. The prepatterned substrates consisted of heavily doped Si wafers as gate electrodes, with a gate dielectric layer of thermally oxidized SiO2 measuring 300 nm in thickness. Gold electrodes were used as the source and drain, with channel lengths ranging from 2-10 μm and widths of 10,000 μm. The preparation of these substrates was conducted at the NIMS NAMIKI Foundry. Electrical transport properties of the devices were measured using a semiconductor analyzer (Agilent B2902A, Agilent E5272A) inside a controlled environment glove box.

References

1. Osonoe, K.; Kano, R.; Miyazawa, K.; Tachibana, M. Synthesis of C70 two-dimensional nanosheets by liquid–liquid interfacial precipitation method. *J. Cryst. Growth.* **2014**, *401*, 458–461.

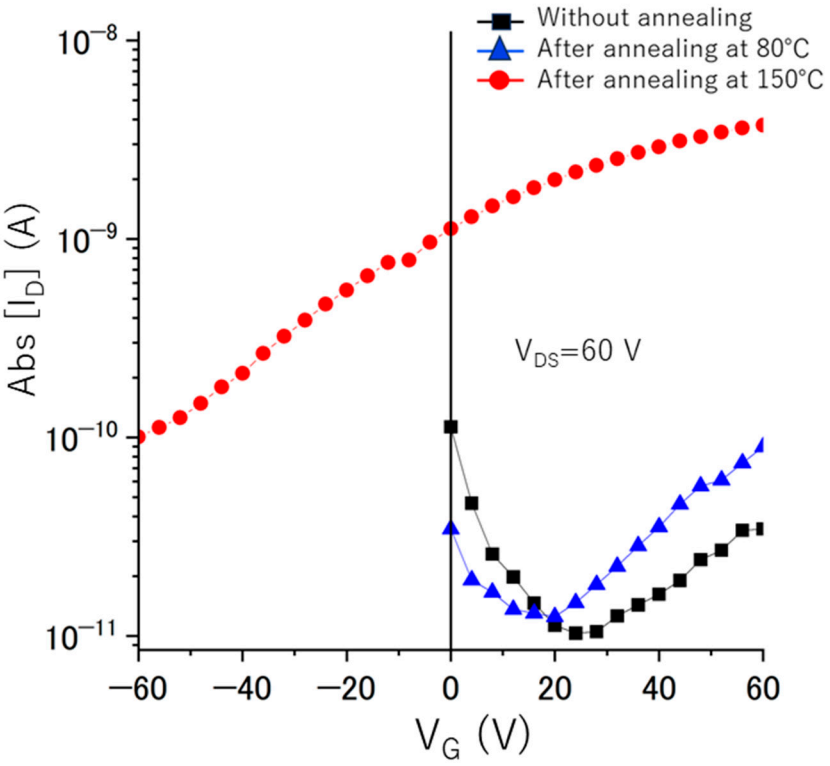

Fig. S1. Transfer (I_D-V_G) characteristics of C_{70}/Fc nanosheets in the dark after annealing.