Graphene-based extraordinary magnetoresistance devices: From fabrication to characterization

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Abstract

The extraordinary magnetoresistance (EMR) effect observed in graphene opens the door to developing highly sensitive magnetic field sensors, with potential applications in data storage, spintronics, and biomedical diagnostics [1,2]. Optimization of EMR devices' architecture could thus enable breakthroughs in both fundamental physics and practical applications. Herein, we report on the fabrication and characterization of EMR devices based on graphene. The EMR response varied significantly with different configurations, suggesting a strong dependence on the geometry and contact positions. Our findings offer insights into the potential of graphene-based EMR devices for sensitive magnetic sensing applications and for further exploration of device optimization through structural and geometrical variations.

References

[1] Lu J., Zhang H., Shi W., Wang Z., Zheng Y., Zhang T., Wang N., Tang Z., Sheng P. Nano Lett., 11 (2011), pp. 2973-2977
[2] Pomar T.D., Erlandsen R., Zhou B., Iliushyn L., Bjørk R., Christensen D.V. Applied Materials Today 38 (2024) 102219

Figures

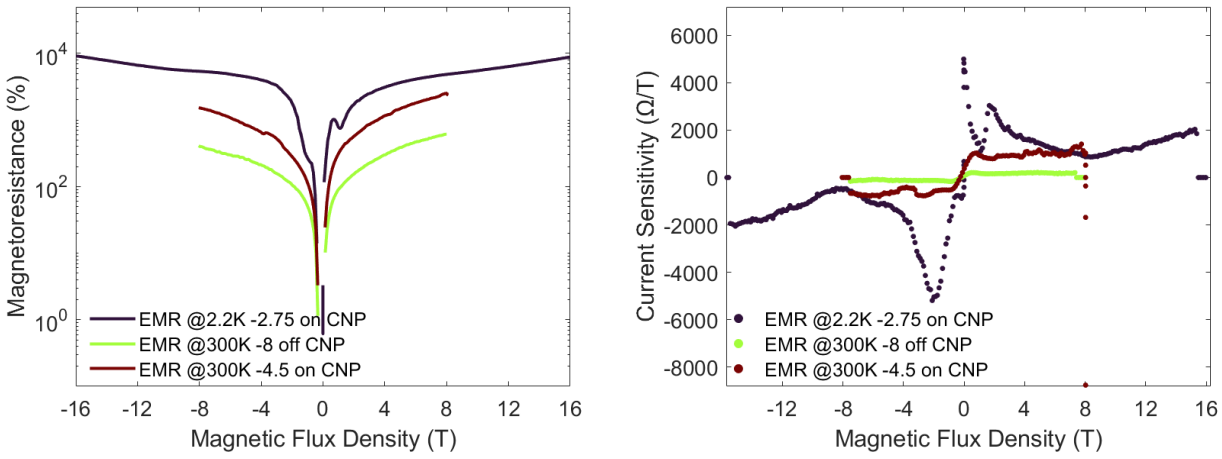

Figure 1: EMR performance and sensitivity of a concentric circular EMR device configuration, showing a strong dependence with temperature and back gate voltage.