Graphene on SiC for Detecting Magnetic Fields in Magnetic Confinement Fusion Reactors

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Abstract

Obtaining controlled thermonuclear fusion is crucial to meet the world's demand for clean energy [1]. However, the magnetic confinement fusion devices pose a challenge of precise magnetic field diagnostic that is essential to contain electrically charged plasma. This ability is becoming increasingly important in the context of extremely difficult operating conditions of magnetic sensors. These conditions are defined as strong neutron radiation and high temperatures up to 350°C. A new type of materials is sought that would be able to meet such difficult requirements. Thus, we report on the first experimental study on the impact of neutron radiation on quasi-free-standing (QFS) graphene [2]. For this purpose, we have fabricated hydrogen-intercalated QFS graphene on semiinsulating high-purity 4H-SiC(0001), passivated it with an Al_2O_3 layer [3], and exposed it to a fast-neutron fluence. Our findings suggest that the system may be a promising platform for magnetic diagnostics in magnetic-confinement fusion reactors.

References

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