Abstract Submitted
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Graphene mediated exchange bias[1] YURIY SEMENOV, JOHN ZAVADA, KI WOOK KIM, NCSU, DEPARTMENT OF ECE TEAM — We have theoretically investigated the role of graphene in mediating the indirect exchange interaction when it is placed between two ferromagnetic dielectric materials. The calculation based on a tight-binding model illustrates that the magnetic interactions at the interfaces affect not only the graphene band structure but also the thermodynamic potential of the system. This induces an indirect exchange interaction between the magnetic layers that can be considered in term of an effective exchange bias field. The analysis clearly indicates a strong dependence of the effective exchange bias on the properties of the mediating layer. Through the dependence on the graphene electro-chemical potential, the effective exchange bias can be modulated electrically over a wide range even at room temperature. This dependence also results in qualitatively different characteristics for the cases involving monolayer and bilayer graphene. The numerical estimation indicates the potential significance of the proposed phenomenon in practical applications.

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