

Evidence of electric field tunable interfacial dipoles in graphene-SrTiO₃ hybrid

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In strongly correlated systems, perovskite oxide SrTiO₃ (STO) exhibits exotic functionalities such as room temperature ferroelectricity[1], polar nanoareas[2] as well as two dimensional electron gas[3] on the surface which have attracted immense interest to exploit the surface of STO. Although, inadequate technology has raised the challenge to the thorough investigation of the STO surface, the recent developments of hybrid devices[4][5][6] have opened up new techniques to explore the surface. We have employed single layer graphene field effect transistor as a probe to study the surface of STO. We experimentally and theoretically provided the evidence of electric field tunable dipolar clusters at the graphene-STO interface. The effect of dipolar clusters of the STO surface on the average resistance of graphene was masked by the trapped charges at the interface of graphene and STO, whereas the low frequency 1/f noise exhibited a bistable characteristic which was attributed to the behavior of interfacial dipoles at different electric fields.

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