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Surface fluorination on graphene field effect transistors XU ZHANG, MIT EECS, HAN WANG, IBM, YI SONG, ALLEN HSU, JING KONG, MIT EECS, MILDRED DRESSELHAUS, MIT Physics, MIT EECS, TOMAS PALACIOS, MIT EECS — Graphene, a zero-gap semiconductor with massless charge carriers, has attracted tremendous interest because of its outstanding electronic properties. One very special property of graphene is the fact that graphene is an all-surface material, so every atom has access to the surface, which has a direct impact on its electronic and chemical performance. Therefore, surface functionalizations provide very effective methods to engineer its electronic properties and make it even more suitable for electronic device applications. Here, we demonstrate that controlled exposure of graphene devices to XeF₂ is an effective way to open a bandgap in graphene. High on/off ratio fluorographene-based field effect transistors are fabricated and analyzed. Raman characterization is also carried out to investigate their structural changes as a result of fluorination treatment.

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