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Observation of Image Potential State in Oxygen Intercalated Graphene on Iridium by Two-Photon-Photoemission Spectroscopy[1] YI LIN, YUNZHE LI, Columbia Univ, JERZY SADOWSKI, Brookhaven National Lab, JERRY DADAP, WENCAN JIN, RICHARD OSGOOD, Columbia Univ — In this talk, we report our experimental results on the first direct observation of image potential state (IPS) in oxygen-intercalated graphene on iridium by two-photo-photoemission spectroscopy. We demonstrate how oxygen intercalation influences the IPS in Gr/Ir and decouples the interlayer interaction. We present measurements of the electronic dispersion and work function in pristine Gr/Ir, oxygen-intercalated Gr/O/Ir, and deintercalated Gr/Ir. LEED patterns are measured during the pristine, oxygen-intercalated, and deintercalated phases of the Gr/Ir sample. Based on these measurements, relative to the pristine case, the work function and the energy location of n=1 IPS relative to the Fermi level increases by ≈0.39 eV and ≈0.3 eV, respectively, due to oxygen intercalation, whereas the effective mass of n=1 IPS is hardly influenced by the intercalation process. Moreover, we achieve the quenching and restoration of the resonance from Ir Rashba states to n=1 IPS in Gr/Ir by oxygen intercalation and deintercalation.

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