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In-situ photoemission electron microscopy investigation of mono- and bilayer graphene growth on Ru $(10\bar{1}0)$

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Epitaxial graphene growth has often been studied on close-packed transition metal substrates, e. g., the Ru(0001) surface, which is a well-studied model system for strong graphene-support interaction. Here, we focus on a Ru surface with different symmetry, i. e., the Ru $(10\bar{1}0)$ surface, to investigate the influence of the presumably modified graphene-substrate interaction on the growth of epitaxial monolayer and bilayer graphene (MLG, BLG) islands. The structural and chemical differences of the graphene on the two different surfaces are investigated by photoemission electron microscopy (PEEM), delivering information on both morphology and electronic structure. In-situ PEEM observation of graphene growth on the Ru $(10\bar{1}0)$ substrate by ethylene decomposition reveals the growth characteristics of MLG and BLG, the latter nucleating via surface segregation of carbon. In contrast to previous studies of the graphene/Ru(0001) system, graphene shows different growth characteristics depending on the growth temperature and relative orientation of the growing islands and surface steps seen in the figure below, whereas similar electronic properties seem to prevail. Yet, when the MLG is decoupled from the Ru $(10\bar{1}0)$ substrate via intercalation of oxygen, a distinct shift in work function is identified, slightly different from the respective shift on Ru(0001).

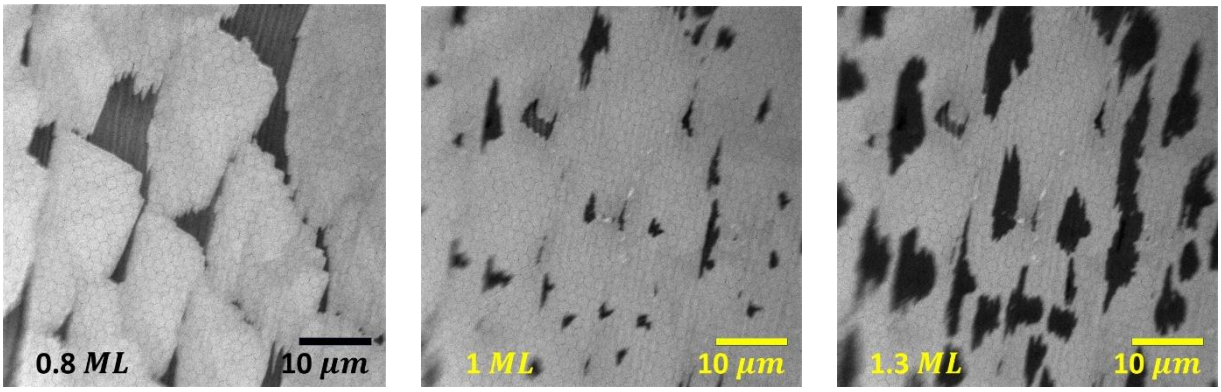

Figure 1: CVD prepared monolayer graphene growing second layer through surface segregation on Ru $(10\bar{1}0)$. The sample was prepared at 700°C and measured with photon energy of 4.9eV.

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