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Growth of Graphene on Cu Single Crystal Substrates TYLER MOWLL, ENG WEN ONG, University at Albany-SUNY, PARUL TYAGI, Global Foundries, ZACHARY ROBINSON, College at Brockport-SUNY, CARL VENTRICE, SUNY Polytechnic Institute — A common technique for synthesizing single-layer graphene films is CVD on Cu foil substrates. However, the presence of crystalline defects in the CVD graphene films results in a reduction in the transport properties. In order to achieve a better understanding of the influence of the surface termination of the Cu substrate on the crystallization of graphene during the CVD process, a systematic study of graphene growth on Cu(100), Cu(110), and Cu(111) crystals has been performed. The graphene synthesis is done in a UHV chamber that has been modified to perform graphene growth at pressures as high as 100 mTorr. The precursor gas used is ethylene. This growth procedure allows for the preparation of the clean Cu surfaces in UHV, growth under typical CVD conditions, and characterization of the graphene in UHV, without exposing the sample to atmospheric contaminants. Our results indicate that the surface termination of the Cu substrate has a strong influence on the decomposition rate of the ethylene and the rotational alignment of the graphene grains as they nucleate on each surface. For Cu(111), single-domain graphene growth can be achieved for ethylene pressures of 5 mTorr or less. For both Cu(100) and Cu(110), a minimum of two graphene domains is always observed.

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