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Role of Surface Termination on the Growth of Graphene on Cu[1] TYLER R. MOWLL, ENG WEN ONG, University at Albany-SUNY, PARUL TYAGI, Global Foundaries, ZACHARY R. ROBINSON, U.S. Naval Research Laboratory, CARL A. VENTRICE, JR., SUNY Polytechnic Institute — Graphene growth on on-axis Cu(100) and Cu(111) substrates and a Cu(111) substrate intentionally miscut by 5° was performed to determine the effect that the substrate termination has on both the rate of carbon deposition and the crystal quality of the graphene. A CVD process using C_2H_4 was used to grow the graphene. All experiments were performed in a UHV chamber, and the surfaces were cleaned using multiple Ar sputtering and annealing cycles until the LEED demonstrated a clean surface. By heating the substrates to 900 °C in UHV and then backfilling with 5 mTorr of C_2H_4, graphene could only be grown on the off-axis Cu(111) surface. This is attributed to the high vapor pressure of Cu and the low reactivity of the on-axis surfaces. By first backfilling with 5 mTorr of C_2H_4 and heating the substrate to 900 °C, graphene could be grown on both the on-axis Cu(100) and off-axis Cu(111) substrates. To achieve growth on the on-axis Cu(111) substrate, an argon overpressure was used to suppress Cu sublimation. Growth of graphene at 900 °C using a mixture of 5 mTorr C_2H_4 and 45 mTorr of argon produced single domain epitaxial films on the Cu(111) substrates and two domain epitaxial films on the Cu(100) substrate.

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