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Quantum Hall Effect in Graphene Bilayers Grown on Copper by Chemical Vapor Deposition[1] BABAK FALLAHAZAD, The Microelectronics Research Center, The University of Texas at Austin, YUFENG HAO, The University of Texas at Austin, KAYOUNG LEE, SEYOUNG KIM, The Microelectronics Research Center, The University of Texas at Austin, RODNEY RUOFF, The University of Texas at Austin, EMANUEL TUTUC, The Microelectronics Research Center, The University of Texas at Austin — We report an investigation of quantum Hall effect in graphene bilayers grown on Cu substrates by chemical vapor deposition. Raman spectroscopy of the as grown graphene bilayers reveals a position dependent full width half maximum of the 2D peak, ranging from 22 to 55 cm^{-1}, suggesting the bilayer is a mixture of Bernal stacked and decoupled graphene monolayers. Using scanning Raman spectroscopy we identify areas with either wide (45-55 cm^{-1}), as well as narrow (22-26 cm^{-1}) 2D peaks, in order to fabricate back-gated Hall bars on such grains. Magnetotransport measurements in bilayer regions characterized by a wide 2D peak reveal quantum Hall states (QHS) at filling factors $\nu = \pm$ 4, 8, 12 consistent with a Bernal stacked bilayer, which develop at magnetic fields higher than 15 T. In contrast, magnetotransport measurements in bilayer regions defined by a narrow 2D peak shows QHSs down to 3 T, and with a sequence consisting of the superposition of the QHSs of two independent monolayers. We compare the QHS energy gaps extracted from activation measurements with the theoretical Landau level (LL) separation, and estimate the LL broadening.

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