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Electrical and Raman characterizations of chemical vapor deposited (CVD) graphene grains and grain boundaries LUIS A. JAUREGUI, HELIN CAO, Purdue University, QINGKAI YU, University of Houston, YONG P. CHEN, Purdue University — We performed Raman spectroscopy and electrical transport studies on graphene grains grown on copper foils by ambient pressure CVD. These grains are found to be hexagonally-shaped with edges macroscopically parallel to zig-zag directions as evidenced by scanning tunneling microscopy and transmission electrical microscopy. After the grains are transferred to SiO_2/Si, Raman spectroscopy and mapping are performed. The intensity of the D peak (I_D) is negligibly small over most grain area with the notable exception of a few isolated spots, attributed mostly as nucleation centers. We show Raman mapping is a convenient tool to identify grain boundaries, which show large I_D. Simultaneous measurements of both intra-grain and inter-grain electronic transport were performed on merged grains. We found the inter-grain resistivity to be always larger than the intra-grain resistivity. Low temperature inter-grain magneto-resistance (R_{xx}(B)) displays a prominent weak localization (WL) feature, which was not observable or was much weaker for intra-grain R_{xx}(B). Our observation indicates that grain boundaries are major sources of intervalley scattering and strongly affect electron transport in polycrystalline CVD graphene.

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