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Role of Ripples, Edges and Defects in Graphene's Transport: a Scanning Gate Microscopy Study

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Despite much works have been done on the geometric structures of ripples, defects and edge atoms in a graphene device, there has been no report showing the direct correlation between the structures and the transport property. Unlike scanning tunneling microscopy or other electron microscopes, Scanning Gate Microscope (SGM) is a unique microscopic tool with which the local electronic structure and the transport property of a device can be measured simultaneously. We have performed a transport measurement in nanometer scale using a scanning gate microscope (SGM). We have found the nanoscopic pictures of electron and hole puddles and the role of graphene- device edges in the transport measurements. These experimental findings were successfully explained with a theoretical model.