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Conductance fluctuation and dimensional crossover in hydrogenated graphene systems DUK-HYUN CHOE, KEE JOO CHANG, KAIST, KAIST TEAM — The conductance of mesoscopic disordered systems in the localized transport regime exhibits extremely large sample-to-sample fluctuations. Thus, their transport properties must be understood in terms of the conductance distribution function. Although the distribution functions show distinctive behavior depending on the dimension of system, previous studies have been mainly focused on one, two, and three dimensional systems individually. Here, we investigate the dimensional transition from two-dimensional (2D) graphene to quasi-one-dimensional (Q1D) graphene nanoribbons and discuss the effect of the dimensional crossover on the conductance fluctuation. As a model system, we consider hydrogenated graphene systems which have attracted much attention due to the observation of a metal-insulator transition. Adopting two different strategies to examine the crossover behavior of conductance between Q1D and 2D systems, we find that a transition from 2D to Q1D is attainable by reducing the sample width, while it is not possible by increasing the length of the 2D system. Our results provide fundamental insights into the dimensionality change not only in graphene, but also in general mesoscopic systems in the localized regime.

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