EDITORIAL

Journal of Semiconductors
(2020) 41, 070101
doi: 10.1088/1674-4926/41/7/070101

Preface to the Special Issue on Quantum Transport in Mesoscopic Systems

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Mesoscopic systems, including nanowires, quantum dots and two-dimensional electron gases, are excellent platforms for studying emerging quantum phenomena, especially in the field of electrical transport. Quantum transport covers vast scopes of condensed matter physics, such as superconductivity, quantum Hall effect, and many investigations in mesoscopic devices.

In this special issue, we bring our readers a collection of cutting-edge studies in a variety of expertise of mesoscopic physics and devices from 10 research teams. Here are some teasers to this issue. $Na_2Ta_4O_{11}$, a new type of 2D insulator nanocrystal, was obtained by the chemical vapor deposition method, which can be regarded as a promising candidate for the implementation of dielectric materials in mesoscopic field-effect transistors. Quantum transports, such as gate-tunable metal-to-insulator transition in an ultra-thin semiconducting GaTe nanosheet, gate-tunable Shubnikov–de Haas oscillations and quantum Hall effect in Mn-doped epitaxial Dirac semimetal Gd_3As_2, charge transports in a dual-gate confined MoS_2 channel, and electron hopping behaviors in silicon junctionless nanowire transistors, are introduced. Using van der Waals heterostructure as a platform, a novel non-volatile optical resistive random access memory and a plasmonic effect assisted efficient room-temperature infrared photodetector were reported. Moreover, viewpoints articles as well as a review paper are included in this issue, in topics such as the long-standing contact issue in 2D transition metal chalcogenides, together with the famed story of silicon quantum dots as a playground to manipulate single spins.

We sincerely hope that researchers in the community of mesoscopic physics and devices enjoy the studies published in this special issue. And we strongly encourage authors to contribute their future high-quality works to the *Journal of Semiconductors*.

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