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Low-Dimensional Materials for Quantum Science and Technology

Guest Editor:

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Message from the Guest Editor

Low-dimensional materials such as zero-dimensional (0D) quantum dots and (1D) one-dimensional carbon nanotubes show an electronic wavefunction confined in one or more of their three dimensions. These spatial constraints lead to quantum size effects which strongly modify their electronic and optical properties with respect to their bulk counterparts.

Relevant examples of low-dimensional systems are two-dimensional (2D) materials such as graphene, transition metal dichalcogenides, and hexagonal boron nitride. These systems offer strong light–matter interactions, many-body effects, tunable band gaps, and novel excitonic effects at room temperature. Moreover, they are the building blocks from which are formed tailored van der Waals heterostructures, with control at the monolayer level. This offers unprecedented opportunities for engineering their bandgap for fundamental science and applications.

In recent years, quantum emitters with tailorable electronic band structure were found in various 2D materials, offering the prospect of their deterministic position control and integration into complex electronic and photonic devices [...]

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Message from the Editor-in-Chief

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