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Dynamic Quantum Nanostructures Controlled by Surface Acoustic Waves

- Manipulation of Electrons and Holes by Ultrasonic Waves -

Motivation

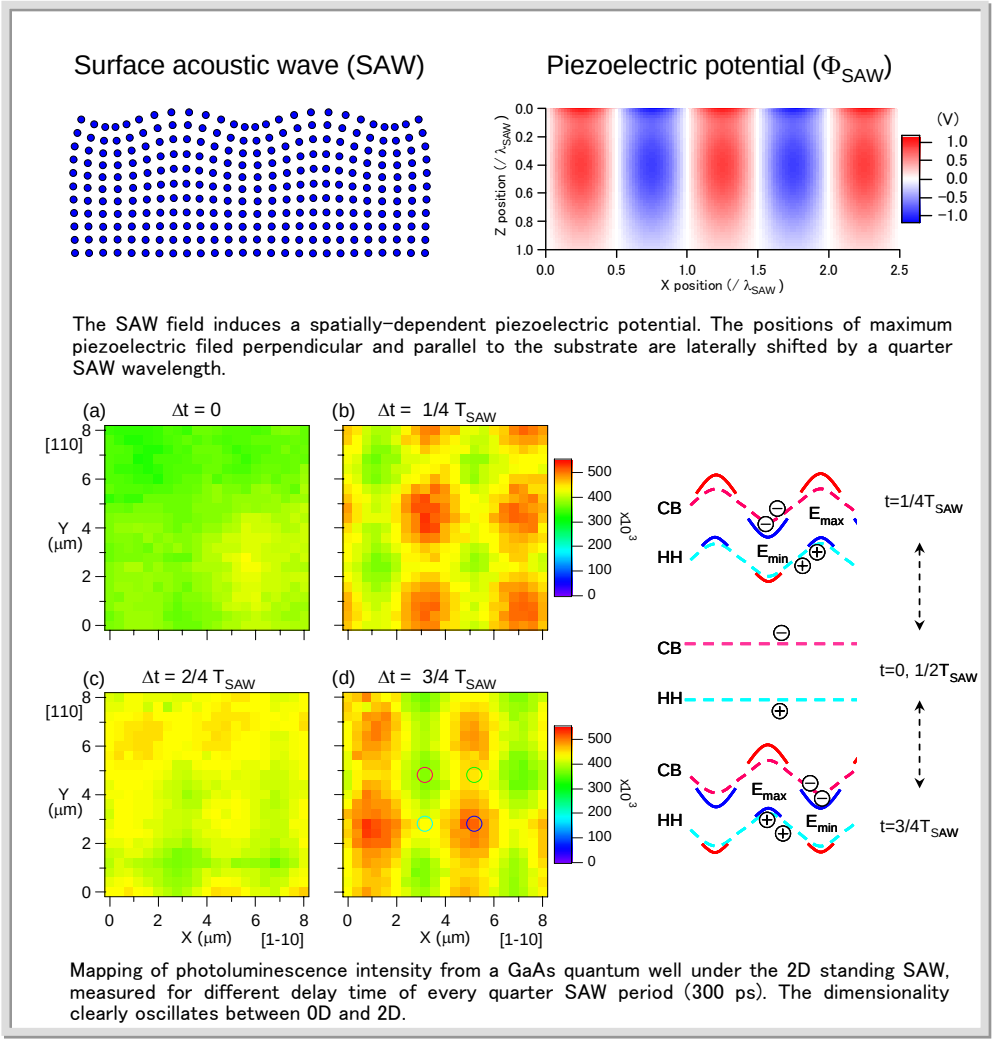
We study spatial modulation of the piezoelectric potential induced by surface acoustic waves (SAW) traveling on piezoelectric materials. Our interest is to freely control the motion of carriers trapped by the dynamic potential minima and also produce tightly confined quantum nanostructures.

Originality

SAW-induced spatial modulation has an advantage that periodicity and uniformity of the nanostructures can be highly improved because the position and the strength of the modulation are electrically controlled. Standing SAW also provides unique phenomena such as oscillation of dimensionality.

Impact

Electrical control of carrier dynamics as well as band structures strongly affects optical properties such as recombination lifetime and polarization anisotropy. In addition, long spin reservation and spin transport properties of trapped electrons by SAWs are expected to lead to the memory for quantum information processing.



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