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Optical harmonics generation in semiconductor quantum dots: A tunable terahertz source YAN XIE, Beijing Computational Science Research Center, WEIDONG CHU, SUQING DUAN, WEI ZHANG, Institute of Applied Physics and Computational Mathematics — The high-order harmonic generation (HHG) study have been extended to semiconductor quantum dots (QDs) and coupled QDs (CQDs), the so-called "artificial atoms and molecules." One motivation of the study of the HHG in QDs is to find an efficient way of terahertz wave generation due to their controllable energy spectra and wave functions. With the help of Floquet theory, we show that the HHG in quantum dot structures can be changed from only odd orders to both odd and even orders by controlling the coupling parameters. The selection rules of the odd-even HHG in a noninversion-symmetric multilevel system are determined by the parity of emitted photon numbers during allowable virtual steps. On the other hand, by mapping the optical problem to a transport problem, we find that the terahertz generation efficiency is determined by the bandwidth of the quasienergy spectrum. Our studies are useful for engineering tunable terahertz sources based on semiconductor quantum dots.

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