World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:17, No:10, 2023

High Harmonics Generation in Hexagonal Graphene Quantum Dots

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Abstract : We have considered the high-order harmonic generation in-plane graphene quantum dots of hexagonal shape by the independent quasiparticle approximation-tight binding model. We have investigated how such a nonlinear effect is affected by a strong optical wave field, quantum dot typical band gap and lateral size, and dephasing processes. The equation of motion for the density matrix is solved by performing the time integration with the eight-order Runge-Kutta algorithm. If the optical wave frequency is much less than the quantum dot intrinsic band gap, the main aspects of multiphoton high harmonic emission in quantum dots are revealed. In such a case, the dependence of the cutoff photon energy on the strength of the optical pump wave is almost linear. But when the wave frequency is comparable to the bandgap of the quantum dot, the cutoff photon energy shows saturation behavior with an increase in the wave field strength.

Keywords : strong wave field, multiphoton, bandgap, wave field strength, nanostructure
Conference Title : ICNOP 2023 : International Conference on Nanotechnology, Optoelectronics and Photonics
Conference Location : Los Angeles, United States
Conference Dates : October 30-31, 2023