

Abstract for NANOMAN2024(500 words)

Picosecond laser ablation mechanism of CVD diamond

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KEYWORDS: CVD diamond, Picosecond laser, Two-temperature model, Molecular dynamics

CVD diamond is of excellent mechanical and optical properties to make it widely applied in the field of microelectronics and optical devices. To achieve efficient and precise processing of CVD diamond, the use of ultrashort pulse laser processing of CVD diamond is an effective method. In this paper, based on the interaction theory between ultrashort pulsed laser and CVD diamond, the changes of absorption coefficient and reflectivity of diamond surface during picosecond laser ablation are taken into consideration, and the double-temperature model are improved to couple with molecular dynamics. The mechanism of picosecond laser ablation of CVD diamond was then investigated, where the temporal evolution of free electron density, electron temperature and lattice temperature on CVD diamond were analyzed and the process of picosecond laser ablation of CVD diamond was simulated. Finally, the built model was verified by the ablation experiment, where the ablation threshold and the achieved surface characteristics are involved.
