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LASER EFFICIENCY AND EXTENDED DYNAMICS OF NANOEMITTERS EMBEDDED IN CARBON NANOFIBERS

We investigated how nanoemitters randomly distributed in single-walled carbon nanotubes (SWCNTs) can enhance laser emission when excited by plasmon-polariton (PP). We found that when the plasmonic frequency of the carbon nanotubes exceeds a critical value, the plasmon-polariton is macroscopically excited throughout the entire SWCNT. The laser generation time of the nanoemitters is strongly influenced by this plasmonic frequency. This leads to a reconnection of the fields in the nanoemitters and a significant coupling between the emitter radiation and the plasmon-polariton fields. We demonstrated that the resonant change in the spatial field structure is related to an increase in PP excitation, which is evidenced by a strong and narrow peak in the inverse participation ratio of the optical field. This phenomenon has implications for the design of active devices in contemporary nanoelectronics.

Keywords

nanotubes,nanoemitters,plasmon,polariton,laser

Reference

Gennadiy Burlak, Gustavo Medina-Ángel,Extended dynamics and lasing of nanoemitters enhanced by dispersing single-walled carbon nanotubes,Journal of Quantitative Spectroscopy and Radiative Transfer,Volume 296,2023,108463,https://doi.org/10.1016/j.jqsrt.2022.108463

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