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Graphene-based spaser OLEG BERMAN, ROMAN KEZERASHVILI, New York City College of Technology of the City University of New York, YURII LOZOVIK, Institute of Spectroscopy — We propose graphene-based surface plasmon amplification by stimulated emission of radiation (spaser) formed in the graphene nanoribbon located near a semiconductor quantum dot (QD). The population inversion of the two electron levels of the QD can be achieved by applying external electric current or laser pumping. If the frequency of the dipole plasmon resonance in a graphene nanoribbon comes in the resonance with the transition frequency for the QD, it is possible to excite plasmons and generate the coherent surface plasmon states in the graphene nanoribbon. Therefore, the oscillating dipole in the QD excites coherent surface plasmons in the graphene nanoribbon. By solving the system of equations for the number of coherent localized plasmons in a graphene-based spaser the optimal design, optimal width of graphene nanoribbon and optimal regime for the graphene-based spaser are found. The minimal size and minimal threshold pumping intensity for the graphene-based spaser are obtained. The advantage of using graphene for the spaser is discussed.

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