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Spaser with graphene nanoribbon OLEG BERMAN, ROMAN KEZERASHVILI, New York City College of Technology, City University of New York, YURII LOZOVIK, Institute of Spectroscopy — A novel type of spaser with the net amplification of surface plasmons (SPs) in doped graphene nanoribbon is proposed. The plasmons in THz region can be generated in a dopped graphene nanoribbon due to nonradiative excitation by emitters like two level quantum dots located along a graphene nanoribbon. The minimal population inversion per unit area, needed for the net amplification of SPs in a doped graphene nanoribbon is obtained. The dependence of the minimal population inversion on the surface plasmon wavevector, graphene nanoribbon width, doping and damping parameters necessary for the amplification of surface plasmons in the armchair graphene nanoribbon is studied. Besides, a new method for high-sensitivity plasmon spectroscopy is proposed based on the usage of a graphene spaser. The plasmon generation is suppressed and even break down near threshold due to absorption at the transition frequencies of the neighbouring nano-objects (molecules or clusters) under study. In result a dip in the spaser generation spectra appears. The sensitivity of this spaser spectroscopy near (slightly above) generation threshold can be very high.

Roman Kezerashvili
New York City College of Technology, City University of New York

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