

Abstract Submitted
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A Moiré Cavity Plasmonic Dye Laser¹ ERTUGRUL KARADEMIR, Department of Physics, Bilkent University, 06800 Ankara, Turkey, SINAN BALCI, Department of Astronautical Engineering, University of Turkish Aeronautical Association, 06790 Ankara, Turkey, COSKUN KOCABAS, ATILLA AYDINLI, Department of Physics, Bilkent University, 06800 Ankara, Turkey — From its first conception [1] to its first demonstration, [2] plasmonic lasers have been an intriguing topic of research. In this work, Moiré gratings which manifest a cavity state in the SPP dispersion curve [3]. We used a reverse Kretschmann setup to decouple the amplified light component of SPPs. We employed a Moiré cavity with 250+256 nm periodicity together with a Styryl 7 laser dye dissolved in ethylene glycol in 5 mM concentration and obtained a lasing at 718 nm. Pumping threshold was 1.5 mJ/cm² with FWHM of 2.8 nm. Furthermore, periodicities of 242+248 nm and 260+266 nm resulted in proportional shift of the lasing peak. We did not observe any lasing action on samples with Au and Ti coatings, although solely Au coated samples showed plasmonic modes in the spectrum. Resulting lasing peak is highly TM polarized. Reflection map measurements confirm that lasing mode is supported with the cavity state of the metallic Moiré cavity and simulations support reflection map measurements. Thus, we demonstrated, to our knowledge, the first plasmonic dye laser on a Moiré cavity. [1] D. J. Bergman and M. I. Stockman, Phys. Rev. Lett. 90, 027402 (2003). [2] J. Seidel, S. Grafström, and L. Eng, Phys. Rev. Lett. 94, 177401 (2005). [3] A. Kocabas, S. S. Senlik, and A. Aydinli, Phys. Rev. Lett. 102, 063901 (2009).

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