

High Gain Broadband Plasmonic Slot Nano-Antenna

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Abstract : High gain broadband plasmonic slot nano-antenna has been considered. The theory of plasmonic slot nano-antenna (PSNA) has been developed. The analytical model takes into account also the electrical field inside the metal due to imperfectness of metal in optical range, as well as numerical investigation based on FEM method has been realized. It should be mentioned that Yagi-Uda configuration improves directivity in the plane of structure. In contrast, in this paper the possibility of directivity improvement of proposed PSNA in perpendicular plane of structure by using reflection metallic surface placed under the slot in fixed distance has been demonstrated. It is well known that a directivity improvement brings to the antenna gain increasing. This method of diagram improving is also well known from RF antenna design theory. Moreover the improvement of directivity in the perpendicular plane gives more flexibility in such application as improving the light and atom, ion, molecule interactions by using such type of plasmonic slot antenna. By the analogy of dipole type optical antennas the widening of working wavelengths has been realized by using bowtie geometry of slots, which made the antenna broadband.

Keywords : broadband antenna, high gain, slot nano-antenna, plasmonics.

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