Supporting Information

Plasmon–exciton interaction strongly increases the efficiency of a quantum dot–based near-infrared photodetector operating in the two-photon absorption mode under normal conditions

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1. Numerical simulation model

Numerical simulation of the active plasmon–exciton medium interacting with an external field was performed using the COMSOL Multiphysics 5.5 software. We simulated the active plasmon-exciton quantum dots (QDs) – silver nanoplates (SNPs) layer between the contacts of the designed photodetector. The simulated system was as an array of SNPs with the size and shape determined experimentally from TEM images, with the longitudinal dimension of a square unit cell of 100 nm (Fig. S1). The position of the center of symmetry of SNP in the simulated media was in the center of the cubic volume of 100 nm × 100 nm × 100 nm. The excitation wave propagated vertically through the cell (perpendicularly to the plane of SNP). The unit cell was a part of the quasi-infinite 2D array in XY plane. The top and bottom of the cell were limited by perfect matching layers (PMLs). The orientation of the polarization of the excitation wave is presented on the Fig. S1b. Due to the high symmetry of the SNP there is no difference in the effect on the plasmon modes of the polarization angles separated by 60° ($\pi/3$). The unique modes are excited only for the polarization angles between blue and red dash lines in the range of 30° ($\pi/6$). This is why in our simulation model we used the polarization orientation in the middle of this range with an angle of 15° ($\pi/12$) to the main symmetry axes of the SNP (blue dash lines).

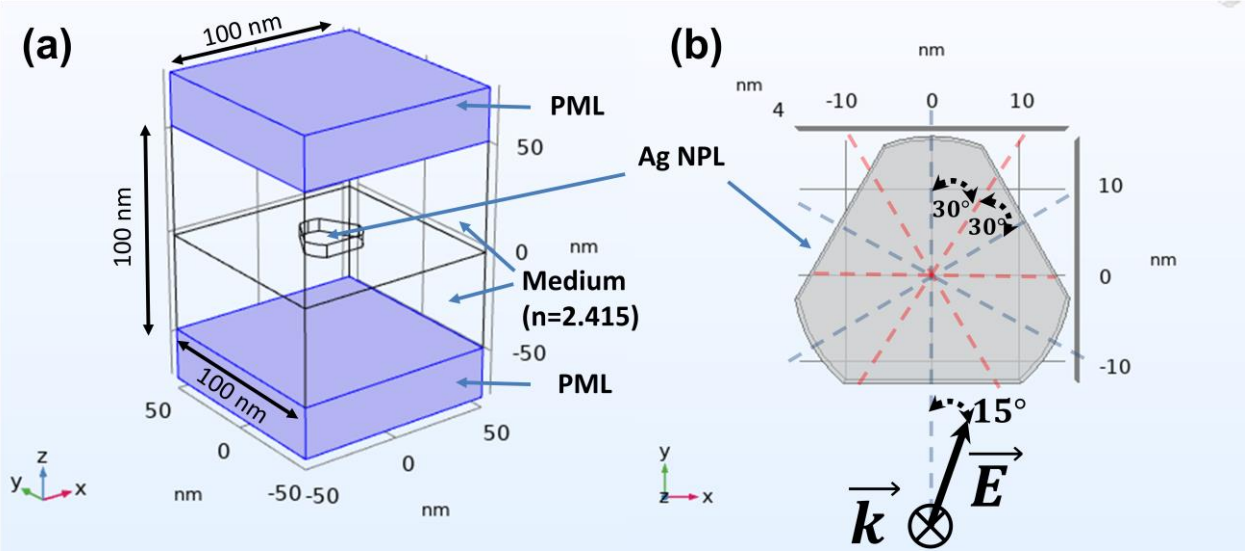

Fig. S1. (a) The schematic representation of the unit cell of the array of SNPs in the medium with n = 2.415 used for the computational model. (b) The geometry of the simulated single SNP and its position to the propagated electrical field.