Electronic Supplementary Information for

Enhanced Normal-Direction Excitation and Emission of Dual-Emitting Quantum Dots on a Cascaded Photonic Crystal Surface

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Supplementary Fig.S1 to Fig.S5

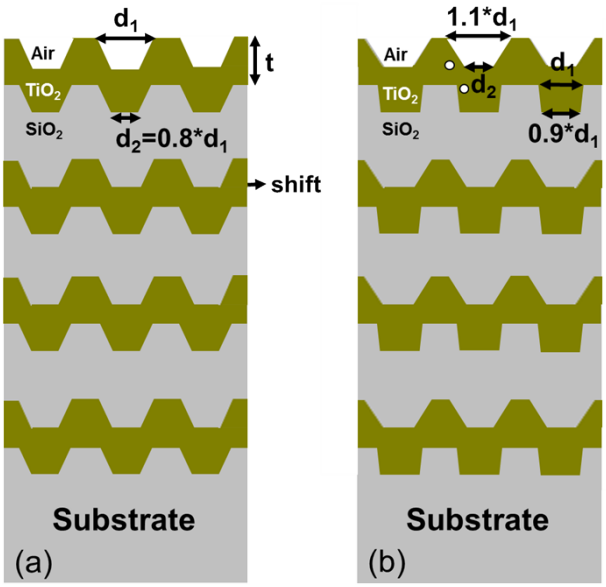

Fig.S1 Modified CPC structure with slope profile for holes' sidewalls (CPCS), $d_2=0.8*d_1$. (a) conformal TiO_2 film, (b) non-conformal TiO_2 film over SiO_2 sidewall, two white circles in the top layer are voids in TiO_2 film.

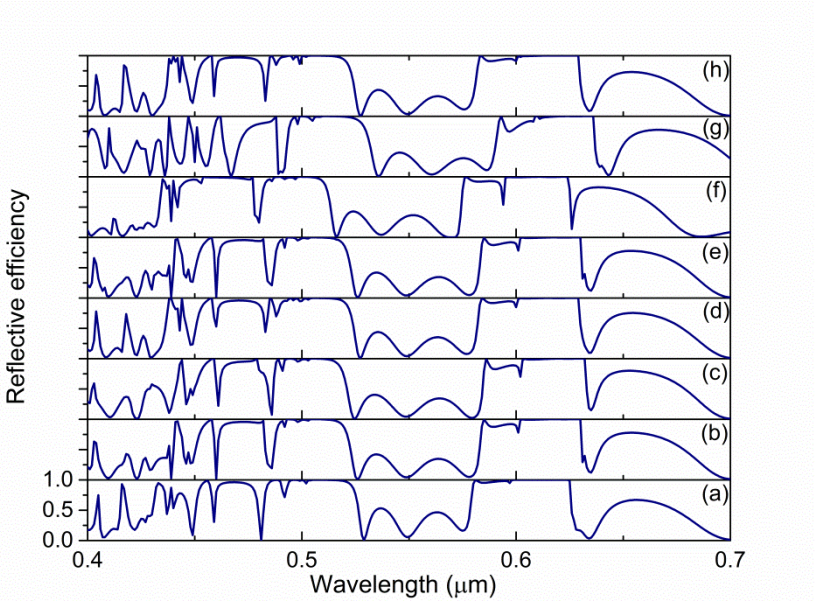

Fig.S2 Reflective efficiency of (a) desired CPC structure, (b) CPCS structures, $d_1=180$nm, $d_2=0.8*d_1$, (c) CPCS with 5%-smaller holes ($d_1=171$nm), (d) CPCS with 5%-larger holes ($d_1=189$nm), (e) CPCS with its second layer 5%-shifted (15nm) in x and y directions, (f) CPCS with 5%-thinner TiO_2 layers (t=171nm), (g) CPCS with 5%-thicker TiO_2 layers (t=189nm), (h) CPCS with non-conformal TiO_2 films on the SiO_2 sidewalls and two voids in TiO_2.

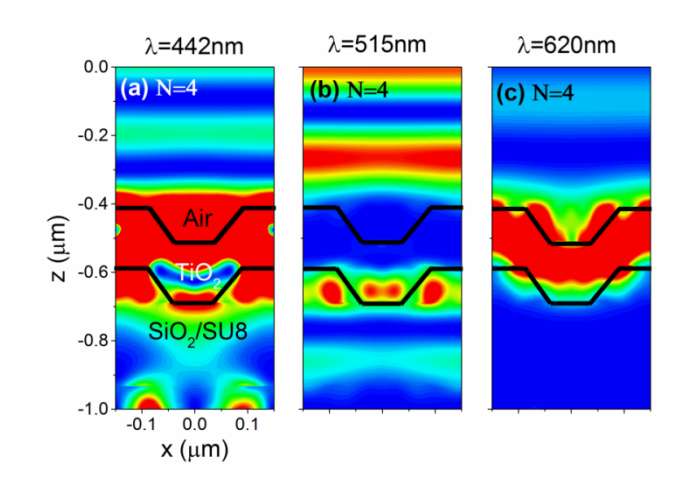

Fig.S3 Near-field electric field (E^2) distributions (Blue=0, Red=max) at y=0 cross section for an incident plane wave in the 4-layer CPCS structure (d_1=180nm, d_2=0.8*d_1, h=110nm, t=180nm, L=350nm) at (a) λ=442nm (excitation), (b) λ=515nm (emission), (c) λ=620nm (emission). The regions between black lines denote the top TiO_2 layers in CPCS structures.

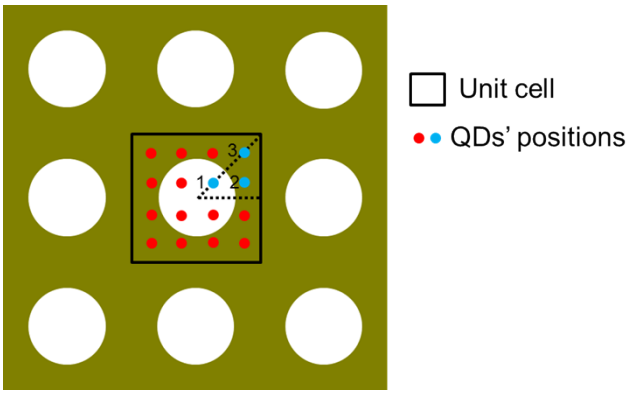

Fig.S4 4×4 QD locations to characterize the CPCS-QD system in square unit cell of CPCS, the positions in 1/8 of the unit cell (position '1', '2', '3' in light blue color) are representative positions of QDs on the surface of CPCS structure because the unit of the CPCS structure has plane symmetry along the x and y directions, and has rotational symmetry.

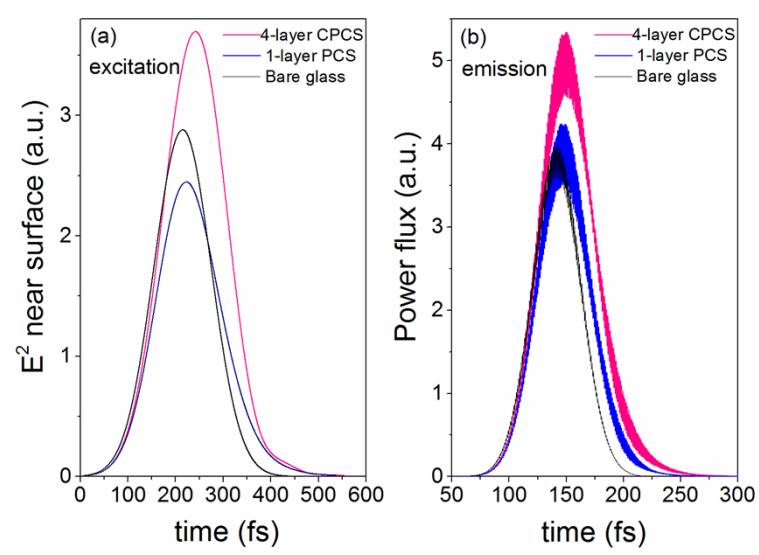

Fig.S5 Spatially averaged (a) excitation (E^2) and (b) emission (power flux through the plane z=7.9μm) of QD at the '1', '2', '3' positions on the surface of bare glass, 1-layer PCS and 4-layer CPCS structures (d_1=180nm, d_2=0.8*d_1, h=110nm, t=180nm, L=350nm), respectively.