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Supporting information

Planar Semiconductor Membranes with Brightness-enhanced Embedded Quantum Dots via Electron Beam Induced Deposition of 3D Nanostructures: Implications for Solid State Lighting

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1. High resolution images of each of the structures fabricated during the first set of depositions

1.1. Platinum patterns

All of these patterns have been fabricated using the precursor (Me₃)MeCpPt, and decomposing it with a deposition current of 150 pA, accelerating voltage of 3 kV, dose of 1 C/cm², step size of 20 nm, and dwelling time of 50ms, at room temperature

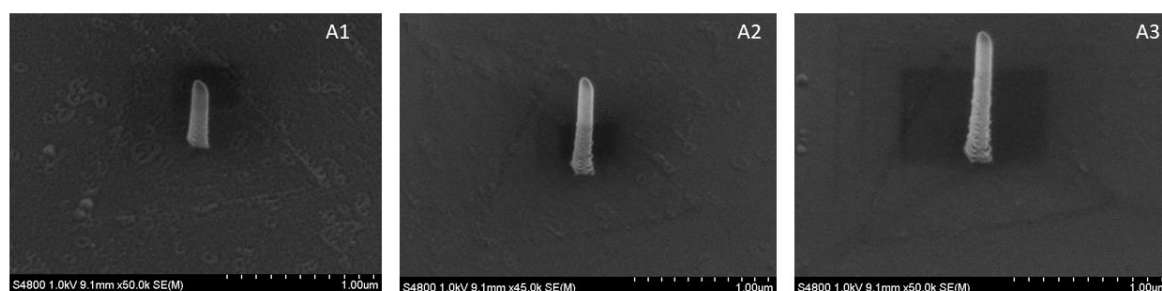


Figure S1: Pt pillars fabricates during the first set of depositions

1.2. SiO₂ patterns

All of this structuers have been fabricated by decomposing the precursor Penta Methyl Cyclo Penta Siloxane (PMCPSP), with a deposition current of 150 pA, accelerating voltage of 3 kV, dose of 1 C/cm², step size of 10 nm, and dwelling time of 0.01ms with variable (100-5000) writing loops at room temperature

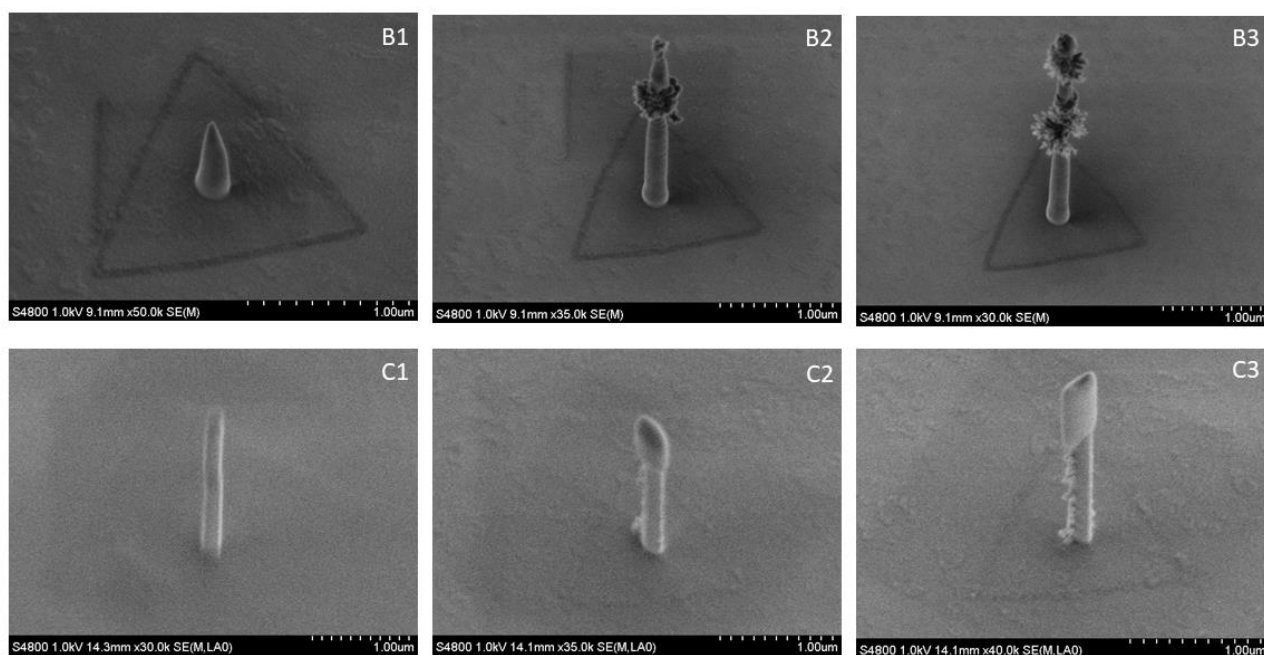


Figure S2 Si-O-C structures fabricated during the first set of depositions from B1 to C3

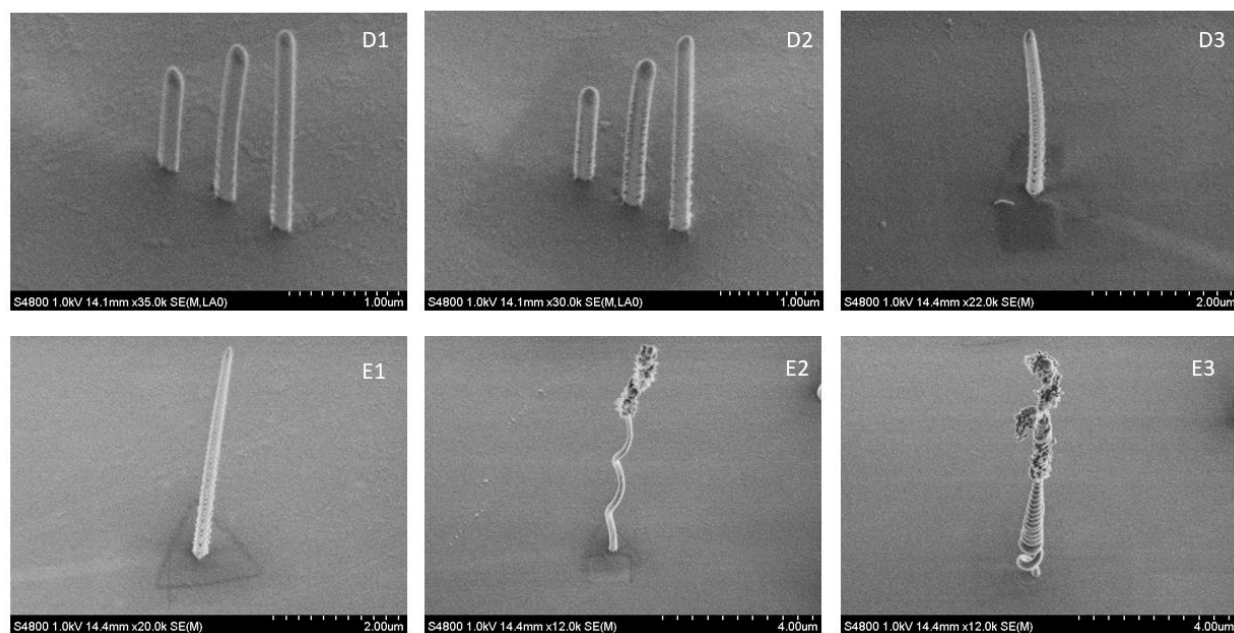


Figure S3 Si-O-C structures fabricated during the first set of depositions, from D1 to E3

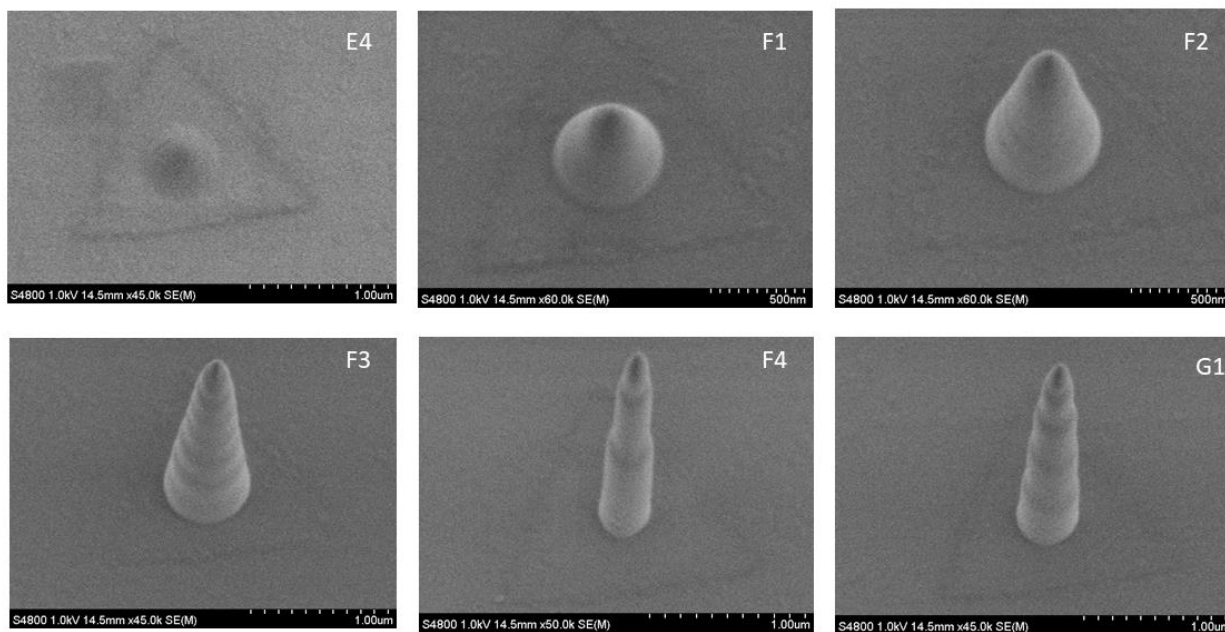


Figure S4 Si-O-C structures fabricated during the first set of depositions, from E4 to G1

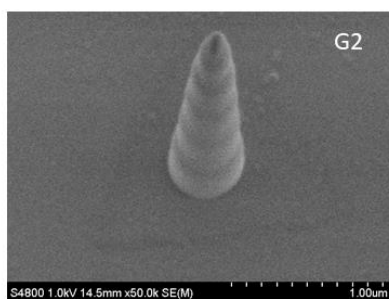


Figure S5 Si-O-C structure fabricated during the first set of depositions, G2

2. Second set of depositions on previously mapped QDs

All of this depositions are of SiO₂ pillars, deposited using the same conditions employed for the first series

Table S1 Geometrical parameters of the structures fabricated during the second set of depositions

Sample #	w (nm)	h (nm)	Sample #	w (nm)	h (nm)	Sample #	w (nm)	h (nm)
1	576	250	8	496	206	20	285	140
2	609	617	9	536	530	21	341	283
3	613	904	10	566	810	22	357	391
4	620	1200	11	569	1070	23	361	511
5	641	1530	12	576	1310	24	373	673
6	657	1700	13	588	1450	25	376	749
7	647	1650						

Sample #	w (nm)	h (nm)	Sample #	w (nm)	h (nm)
14	391	177	26	199	119
15	432	367	27	225	146
16	481	571	28	261	202
17	464	793	29	257	276
18	465	1020	30	270	338
19	476	1070			

Sample #6 shows irregular pattern due to the fabrication error. Please check the SEM image.

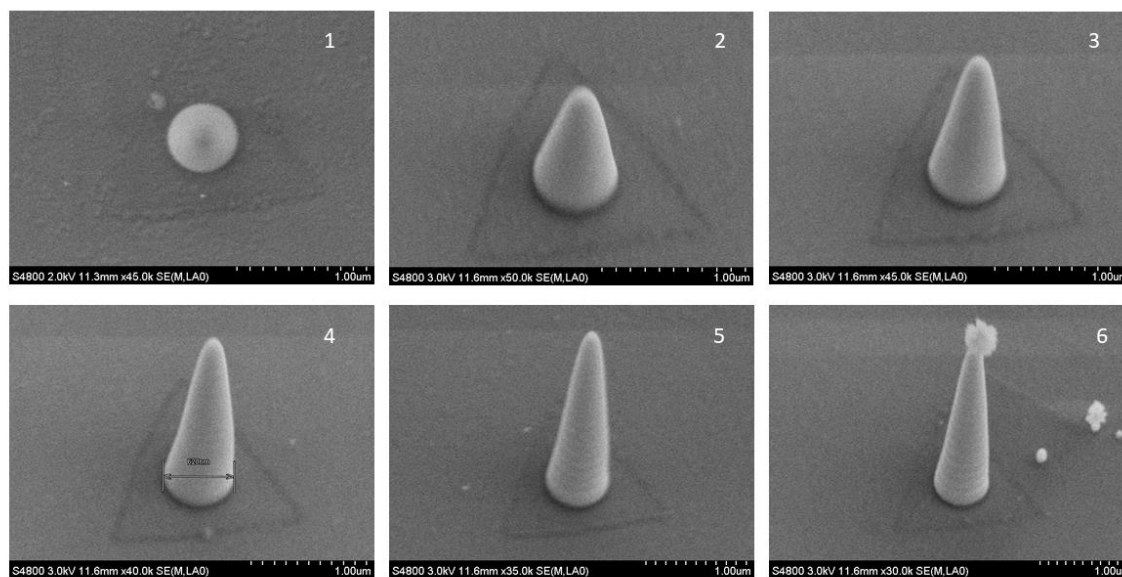


Figure S6 Si-O-C structures fabricated during the second set of depositions, 1 to 6

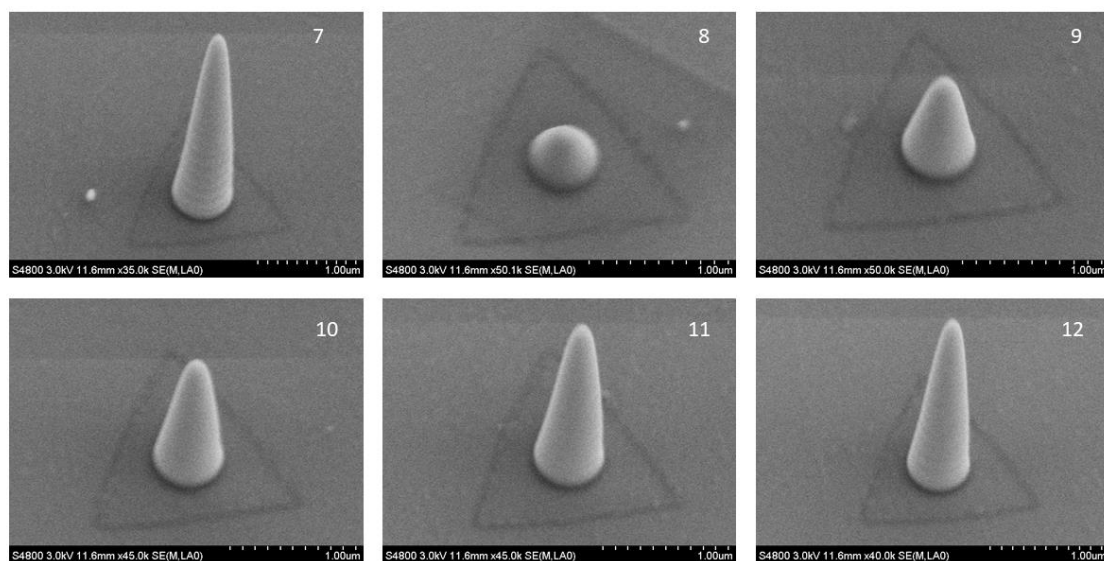


Figure S7 Si-O-C structures fabricated during the second set of depositions, from 7 to 12

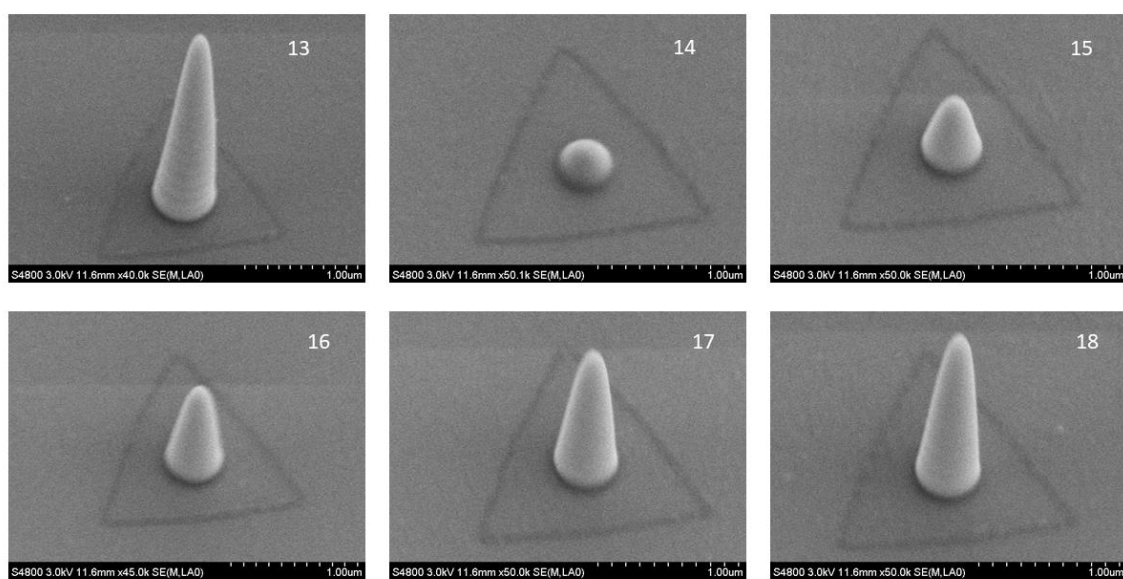


Figure S8 Si-O-C structures fabricated during the second set of depositions, from 13 to 18

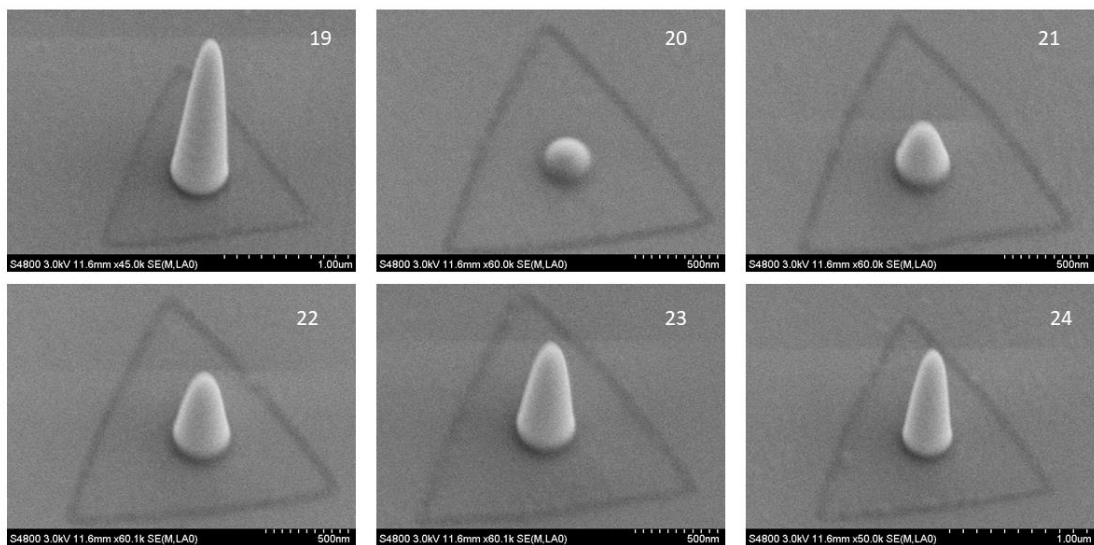


Figure S9 Si-O-C structures fabricated during the second set of depositions, from 19 to 24

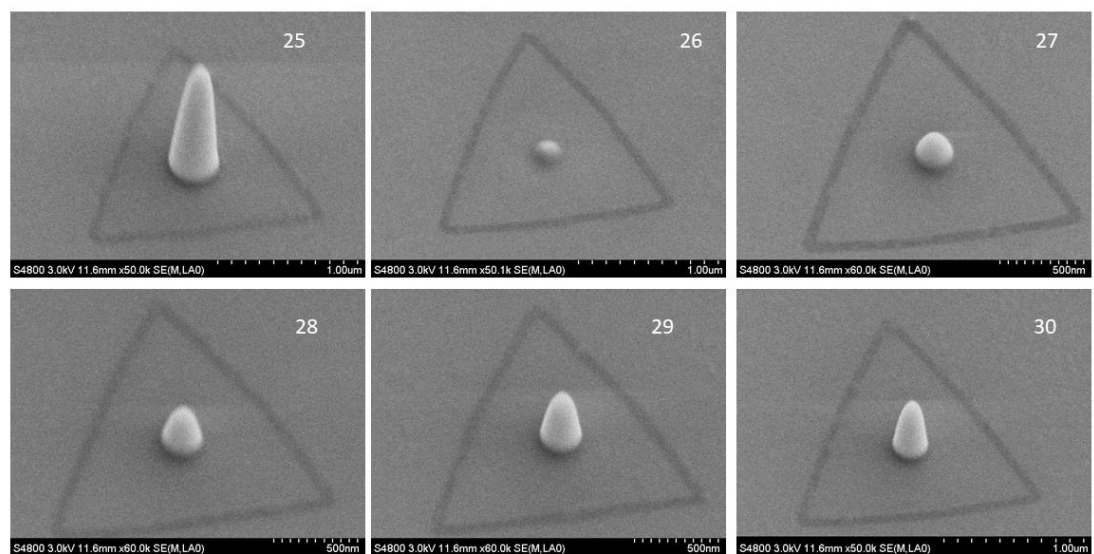


Figure S10 Si-O-C structures fabricated during the second set of depositions, from 25 to 30

3. EDX analysis of SiO_x structures

EDX analysis was performed on SiO_x nanostructures using a Quanta 650 SEM. A typical spectrum and elemental analysis are included.

Table S2 Results of the EDX analysis. Atomic percentages rounded to the nearest integer

Element	Weight%	Atomic%
O K	19.85	47
Si K	12.45	17
Ga K	31.41	17
As L	36.29	18
Totals	100.00	

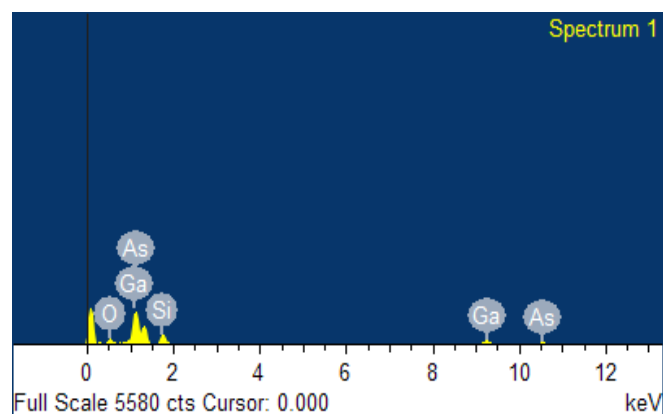


Figure S11 EDS spectrum of the analyzed structure

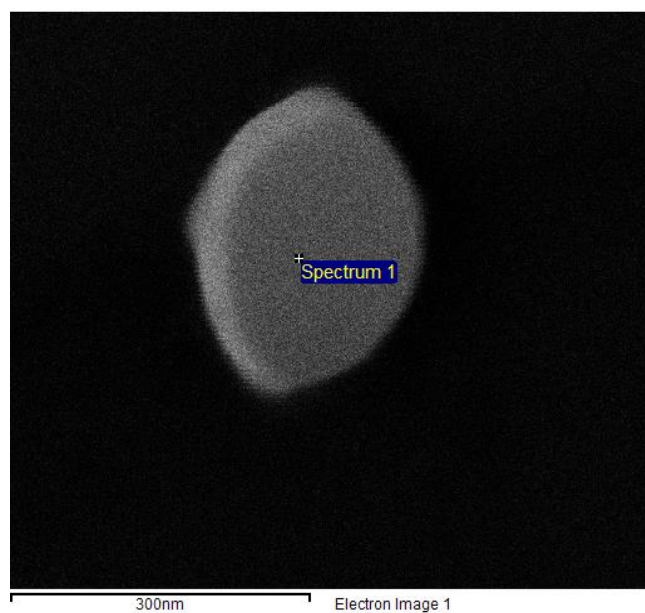


Figure S12 SEM image of the structure analyzed, with the specific point the analysis was performed onto marked out