Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Solid-State Silicon Nanoparticles with Color-Tunable Photoluminescence and Multifunctional Applications

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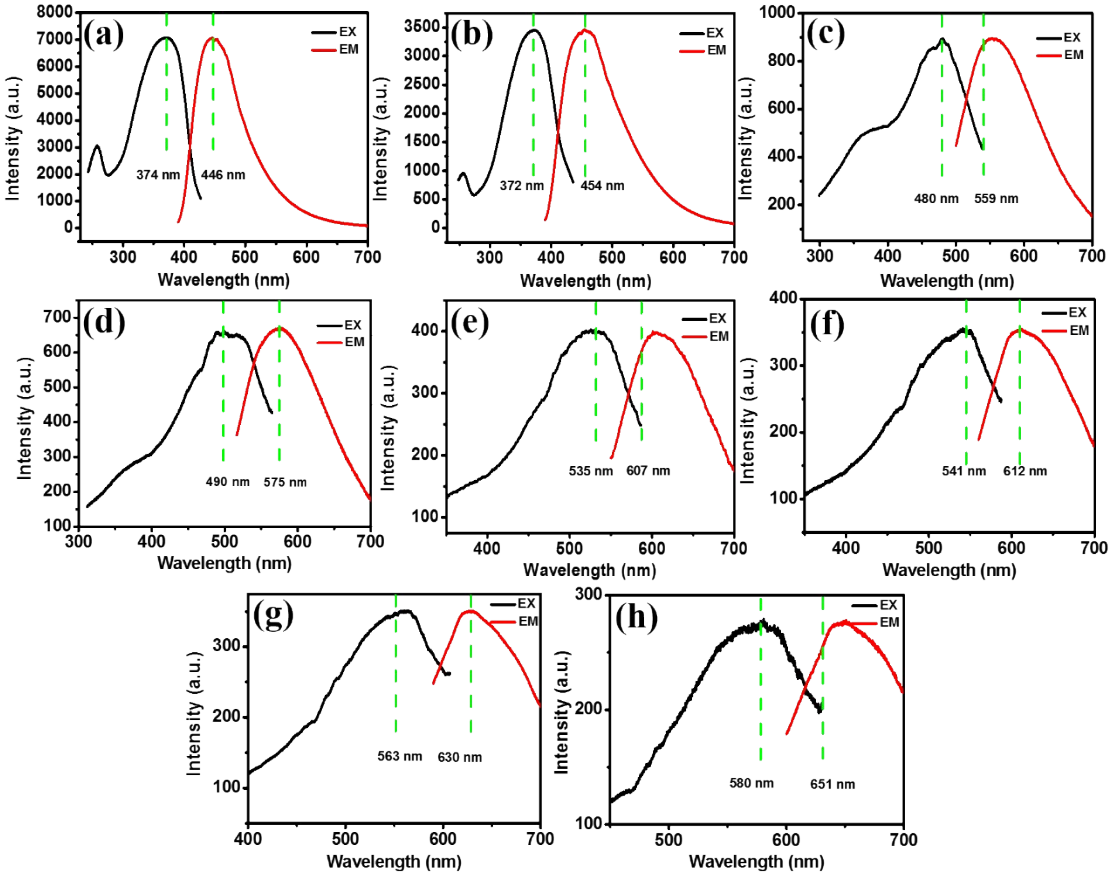

Figure S1. The optimal emission and excitation wavelengths of SSF-2 (a), SSF-6 (b), SSF-10 (c), SSF-20 (d), SSF-30 (e), SSF-60 (f), SSF-120 (g) and SSF-180 (h), respectively.

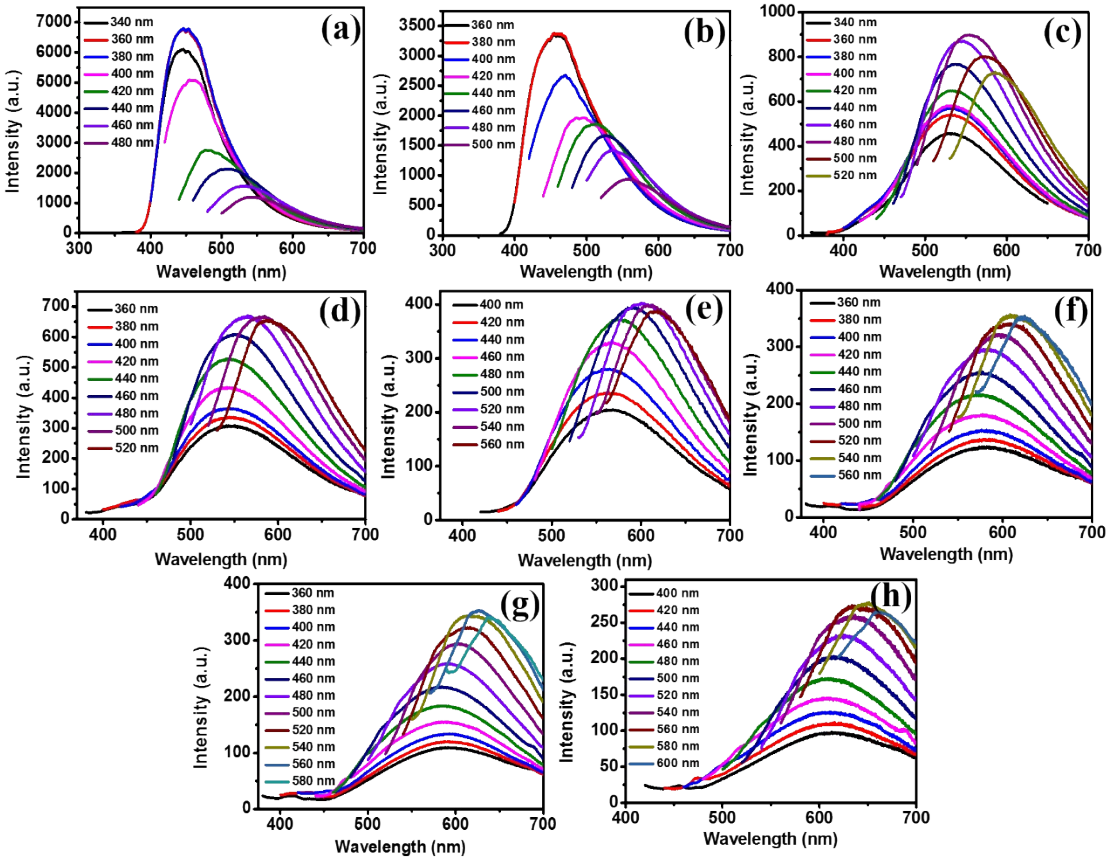

Figure S2. PL spectra of SSF-2 (a), SSF-6 (b), SSF-10 (c), SSF-20 (d), SSF-30 (e), SSF-60 (f), SSF-120 (g) and SSF-180 (h) recorded under the excitation of different wavelengths, respectively.

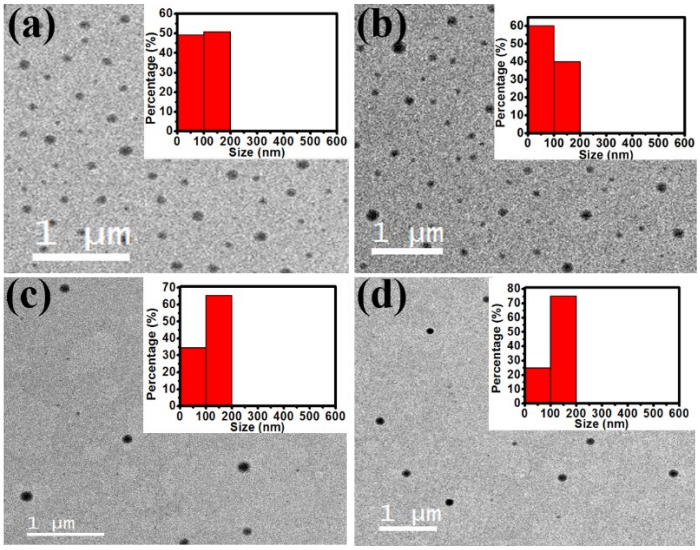

Figure S3. TEM images and size distributions of SSF-2 (a), SSF-10 (b), SSF-120 (c) and SSF-180 (d), respectively.

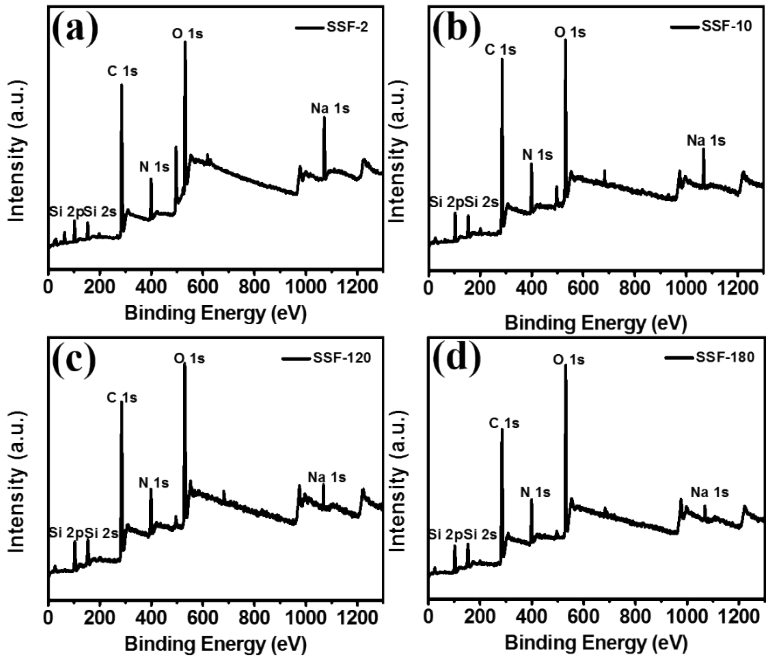

Figure S4. Survey XPS spectra of SSF-2 (a), SSF-10 (b), SSF-120 (c) and SSF-180 (d), respectively.

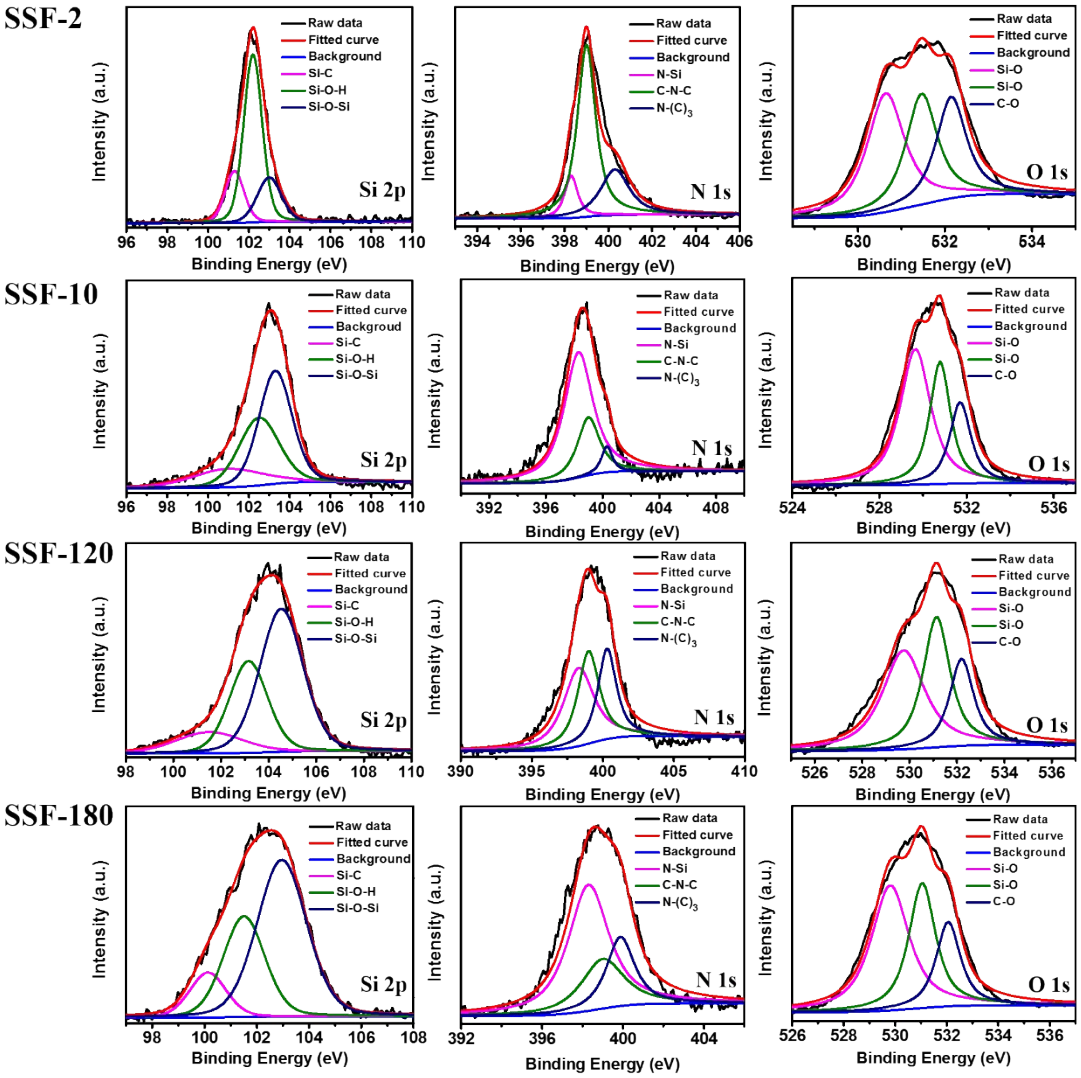

Figure S5. High-resolution XPS Si2p, N1s, and O1s spectra of the four typical Si NPs powders (SSF-2, SSF-10, SSF-120 and SSF-180).

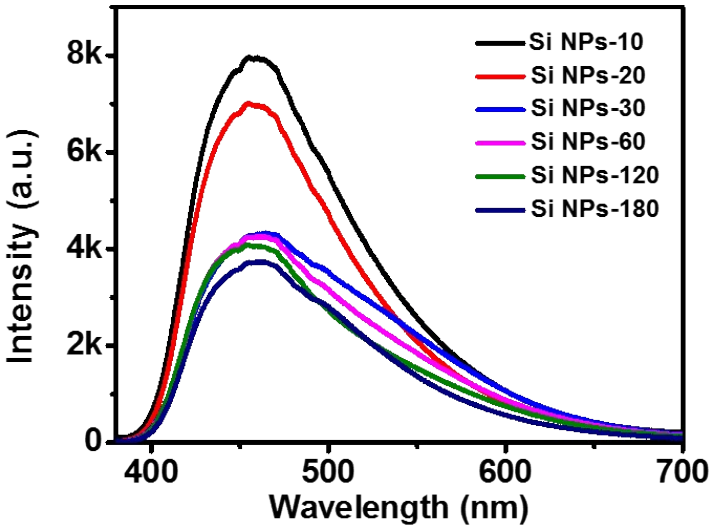

Figure S6. PL spectra of the Group III powders.

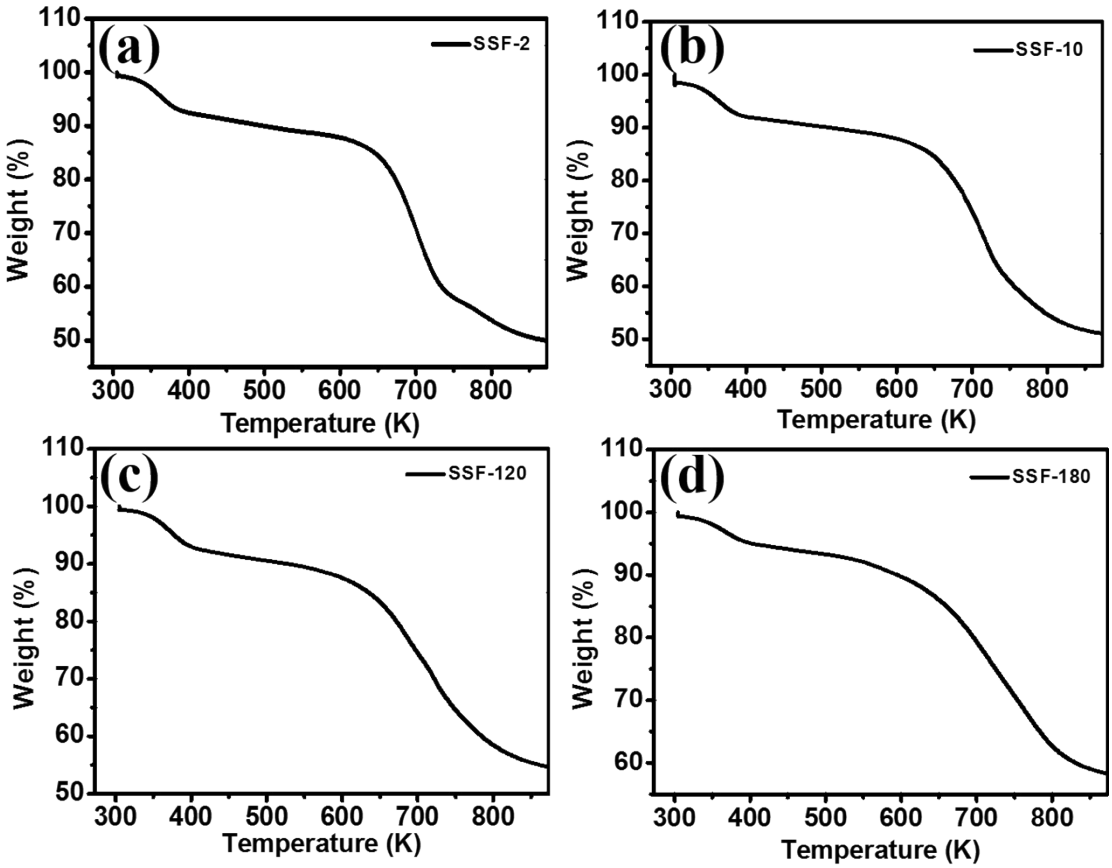

Figure S7. TGA thermograms of SSF-2 (a), SSF-10 (b), SSF-120 (c) and SSF-180 (d), respectively.

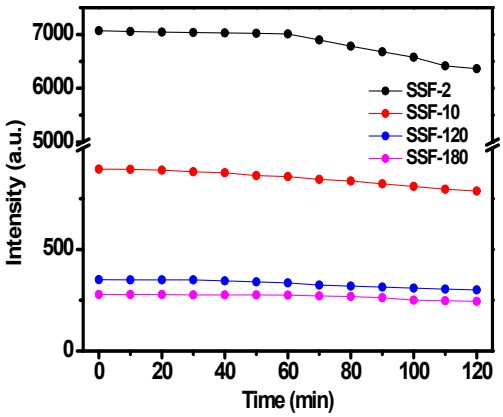

Figure S8. The fluorescent intensities of SSF-2, SSF-10, SSF-120 and SSF-180 exposed to UV light (365 nm).

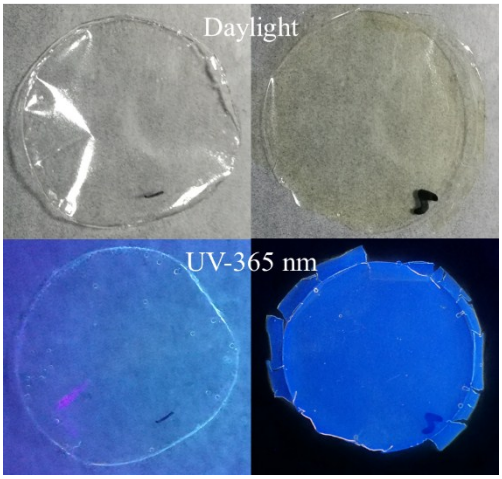

Figure S9. Photographs of the pure cellulose films (left) and CMC/SSF-2 films (right) under daylight (top) and UV light of 365 nm (down), respectively.

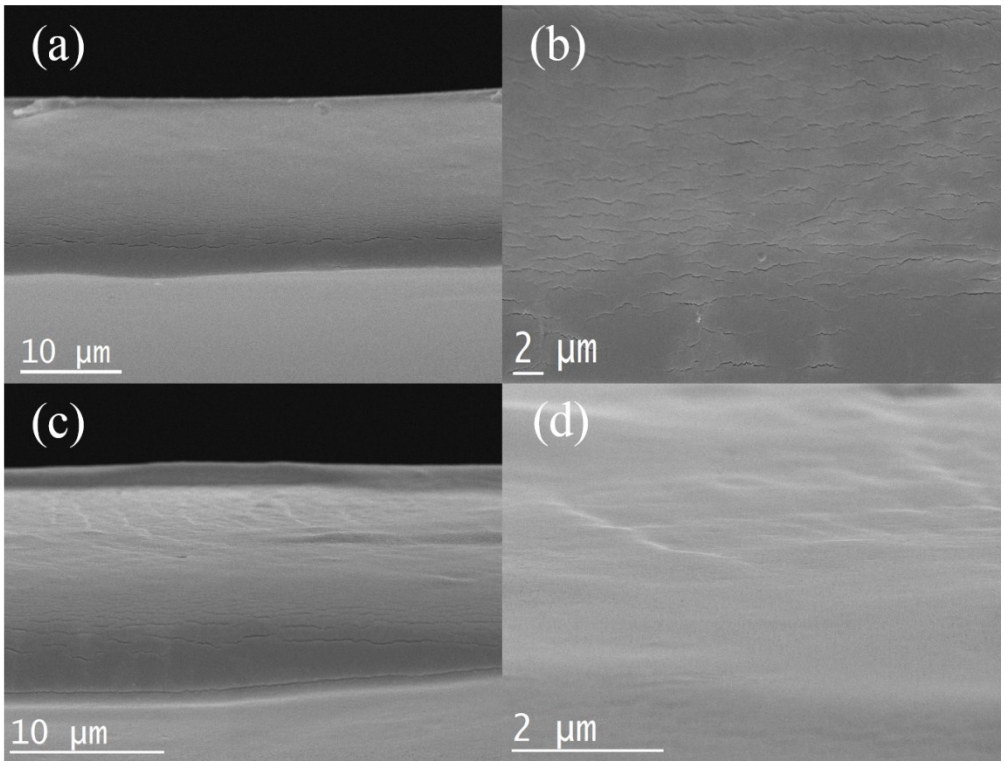

Figure S10. The cross-sections of cellulose films and CMC/SSF-2 films.

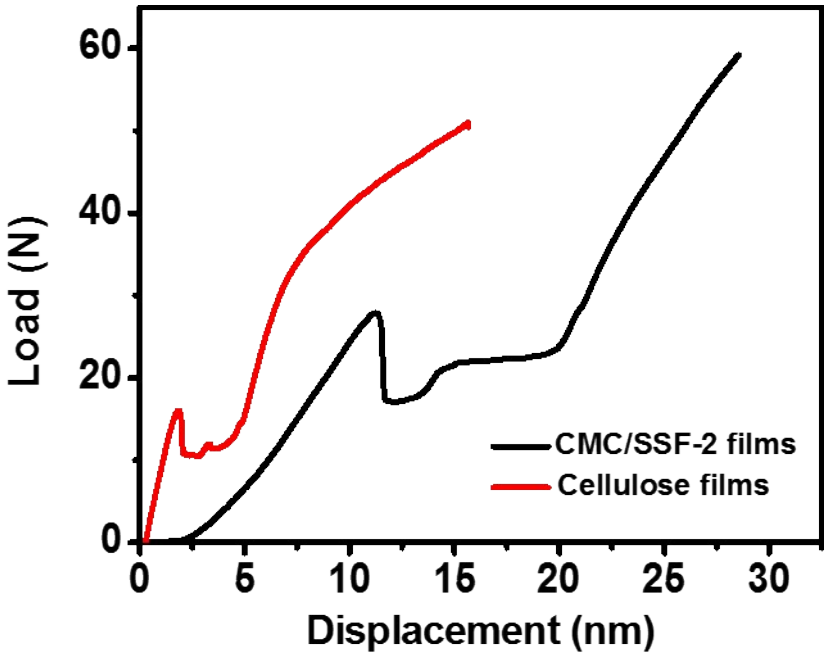

Figure S11. Stretching coefficient diagram of cellulose films and CMC/SSF-2 films.

Table S1. PLQY of the Group I powders.

Samples	SSF-2	SSF-6	SSF-10	SSF-20	SSF-30	SSF-60	SSF-120	SSF-180
PLQY (%)	21.50	12.33	5.00	3.85	3.84	2.25	1.59	1.28

Table S2. The optimal excitation and emission wavelengths of the Group II powders.

Samples	Temperature (K)	Time (min)	EX (nm)	EM (nm)
Si NPs powders	373	10	371	446
	423		370	454
	473		479	550
	523		520	631
	573		540	669

Table S3. The atomic ratio between oxygen and carbon of the Group II powders.

Samples	C	N	O	Si	O/C
SSF-373	58.73%	13.09%	19.63%	8.55%	0.33
SSF-423	54.78%	13.08%	21.92%	10.23%	0.40
SSF-473	54.26%	11.04%	23.78%	10.93%	0.44
SSF-523	52.12%	8.27%	27.95%	11.67%	0.54
SSF-573	43.07%	9.19%	33.25%	14.49%	0.77