SUPPORTING INFORMATION

Shape Evolution and Applications in Water Purification: the Case of CVD-Grown Zn_2SiO_4 Straw-Bundles

XianfuWang, [a] Hongtao Huang, [a] Bin Liu, [a] Bo Liang, [a] Chao Zhang, [a] Qin Ji, [a] Di Chen, [a,*] and Guozhen Shen [a,*]

Wuhan National Laboratory for Optoelectronics (WNLO) and College of Optoelectronic Science and Engineering, Huazhong University of Science and Technology (HUST), Wuhan, 430074, China. Fax: (+86-27-87792225)
E-mail: gzshen@mail.hust.edu.cn; dichen@mail.hust.edu.cn.

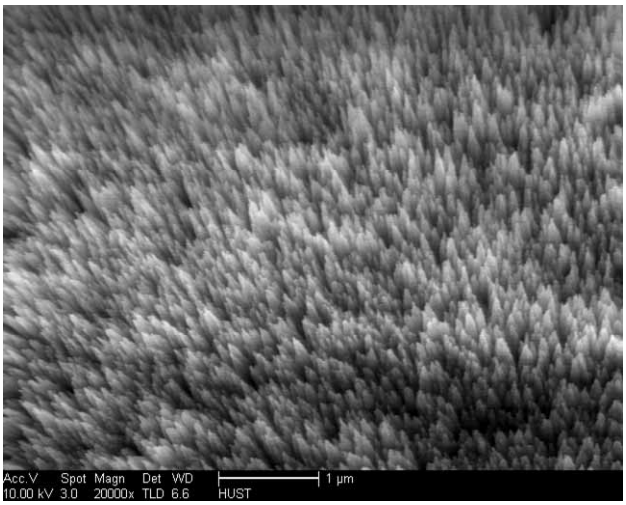

Fig. S1. High-magnification SEM images showing the radial growth nanowires with very high density of an individual straw-bundle-like Zn_2SiO_4 architecture.

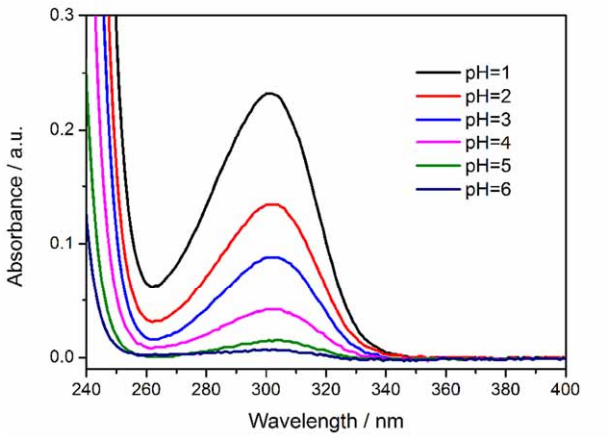

Fig. S2. Effect of the pH value on the adsorption to Cd^{II} using the Zn_2SiO_4 architectures as the absorbents for 3h.

Inos	Initial conc. (mM/L)	Final conc. (c/c_0)		
		Zn_2SiO_4 Straw-Bundles	P25	Zn_2SiO_4 particles
Fe (Ⅲ)	0.5	16%	63.8%	78.8%
Cd (Ⅱ)	0.5	40%	81.8%	81.9%

Table 1 Capacities of Zn_2SiO_4 straw-Bundles, P25, and Zn_2SiO_4 particles for removal of Fe (Ⅲ) and Cd (Ⅱ) ions at pH=4.0 and 6.0 respectively.

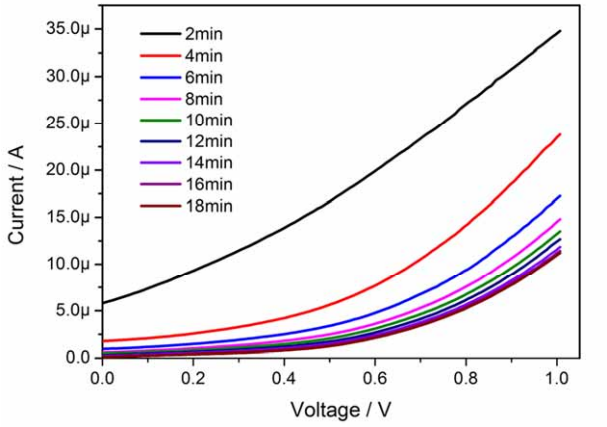

Fig. S3. Typical I-V curves of the cobalt nitrate solutions after treated with the as-synthesized Zn_2SiO_4 architectures at different time.

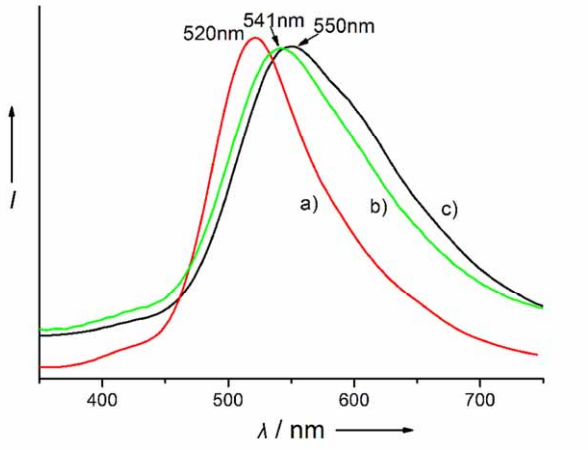

Fig. S4 Room-temperature photoluminescence spectrum of the as synthesized Zn_2SiO_4 architectures, a): Zn_2SiO_4 obtained at 650ºC; b) and c): Zn_2SiO_4 annealed in NH_3 and O_2 at 950 ºC for 15 min, respectively

Photoluminescence (PL) measurements for Zn_2SiO_4 structures were carried out at room temperature using 325nm line of a He: Cd laser as the excitation source. It is well known that Zn_2SiO_4 is a green luminescence material.[1] A green emission situated about 520nm related to Zn_2SiO_4 can be clearly seen in Fig. S4a, which is similar to that of bulk crystal Zn_2SiO_4.[2] The wavelengths of the emission bands are center at 541nm and 550nm (see Fig. S4b, c) after the as-prepared Zn_2SiO_4 were annealed at 950 ºC in NH_3 and O_2 ambience for 15 min. The red-shift of PL spectra after the as-synthesized product was annealed in NH_3 may be attributed to the oxygen defects on the surface. When the as-prepared Zn_2SiO_4 structure was annealed in NH_3, oxygen is deficient. And at the same time, a few hydrogen atoms come from the decomposed NH_3 can combine with O atoms,[3] and take away the oxygen on the surface, which may introduce lots of oxygen vacancies. Zn_2SiO_4 may have ability to absorb oxygen to form oxygen interstitials defects on the surface. When the as-synthesized product was annealed in O_2, oxygen is ample and the concentration of oxygen interstitials on the surface increased, leading to the appearance of orange emission, which may be associated with the red-shift of PL spectra annealed in O_2, as Wu's report about ZnO nanorod.[3] To identify the defects responsible for redshift in Zn_2SiO_4 annealed in NH_3 and O_2, further investigations are still needed.

1. J. Wan, X. Chen, Z. Wang, L. Mu, Y. Qian, *J Cryst Growth* **2005**, *280*, 239-243.
2. X. Congkang, et al., *Nanotechnology* **2005**, *16*, 2808.
3. L. Wu, Y. Wu, X. Pan, F. Kong, *Opt Mater* **2006**, *28*, 418-422.