Room-temperature metal-activator-free phosphorescence from mesoporous silica

Lei Zhao, Tian Ming, Huanjun Chen, Li Gong, Jian Chen and Jianfang Wang*

Department of Physics, The Chinese University of Hong Kong, Shatin, Hong Kong SAR, China and Instrumental Analysis and Research Center, Sun Yat-sen (Zhongshan) University, Guangzhou 510275, China

Electronic Supplementary Information (ESI)

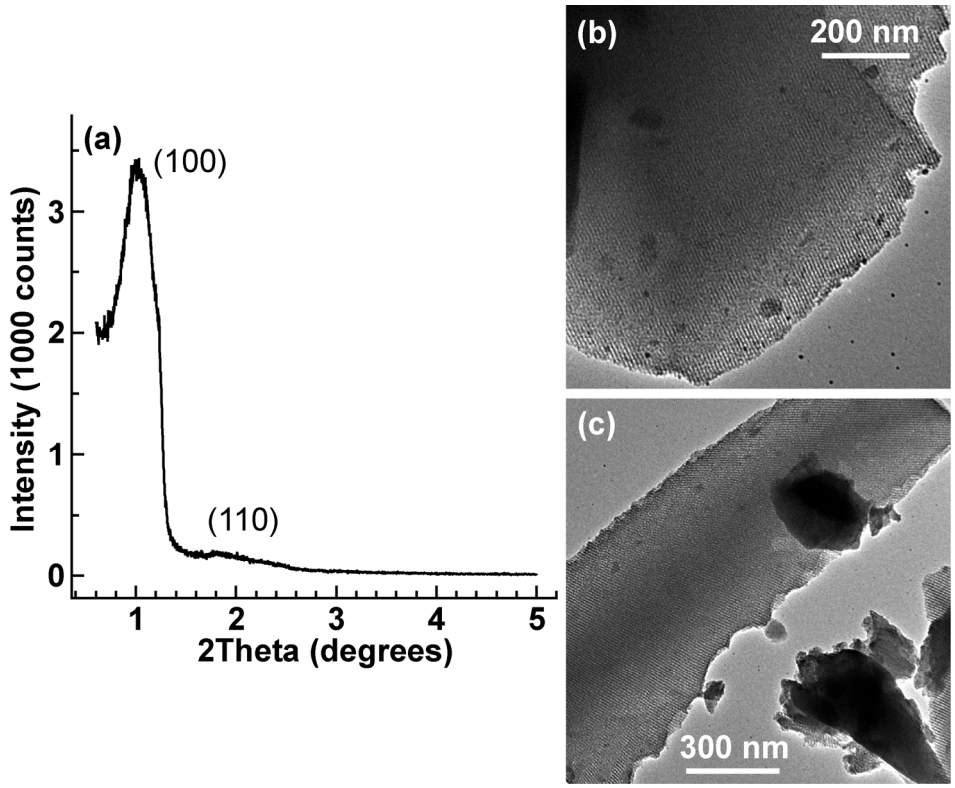

Fig. S1 Structure of the mesoporous silica obtained from calcination at 800 °C. (a) SAXRD pattern. (b, c) Representative TEM images.

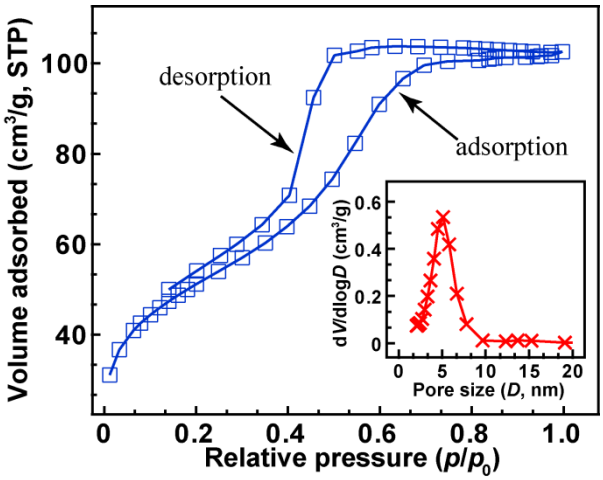

Fig. S2 N_2 adsorption-desorption isotherm measured on the sample calcined at 600 °C. The inset is the pore size distribution obtained from the adsorption branch.

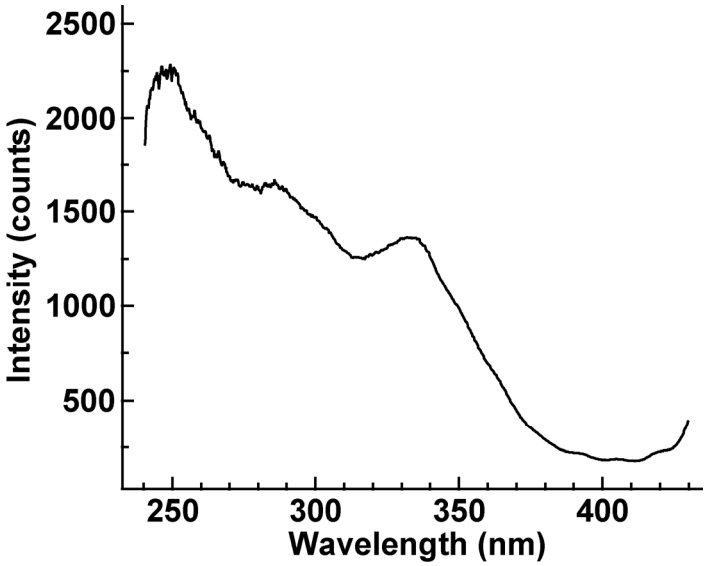

Fig. S3 PLE spectrum of the mesoporous silica obtained from calcination at 600 °C. The emission was detected at 450 nm.

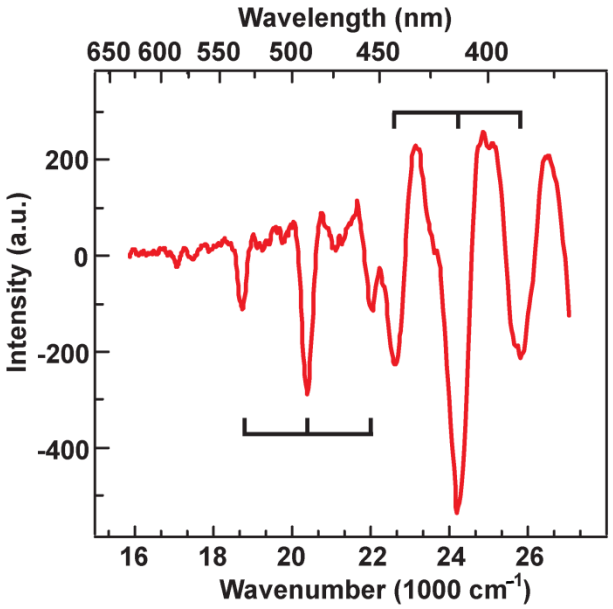

Fig. S4 Second derivative of the PL spectrum of the mesoporous silica obtained from calcination at 600 °C. The curve has been smoothed.

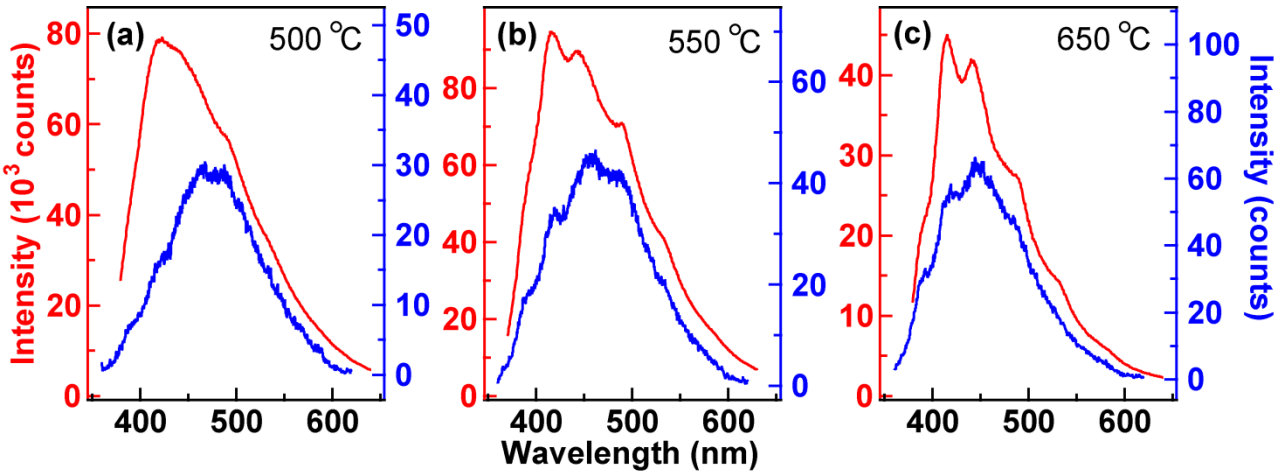

Fig. S5 PL (red) and phosphorescence (blue) spectra of the mesoporous silica obtained from calcination at (a) 500 °C, (b) 550 °C, and (c) 650 °C.

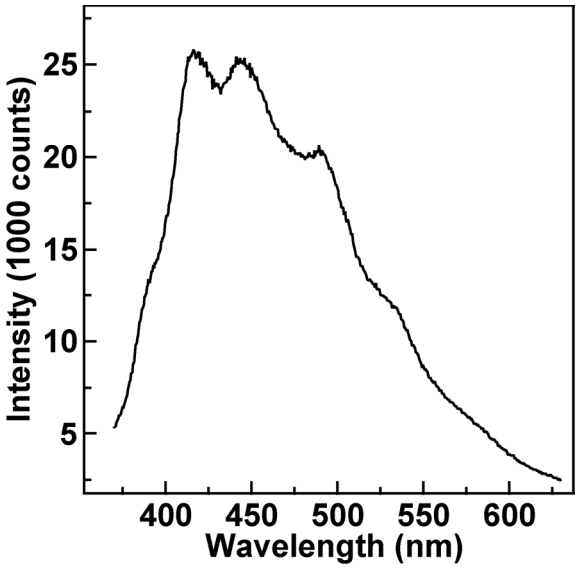

Fig. S6 PL spectrum of the mesoporous silica monolith shown in Fig. 4a and b.

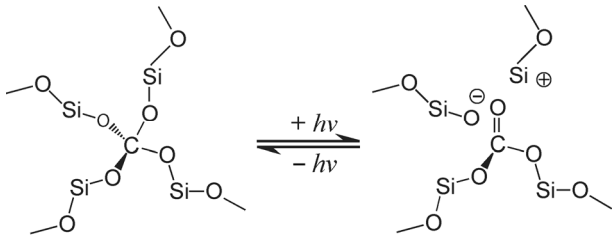

Fig. S7 Proposed luminescent species in the silicate glass and mesoporous silica.

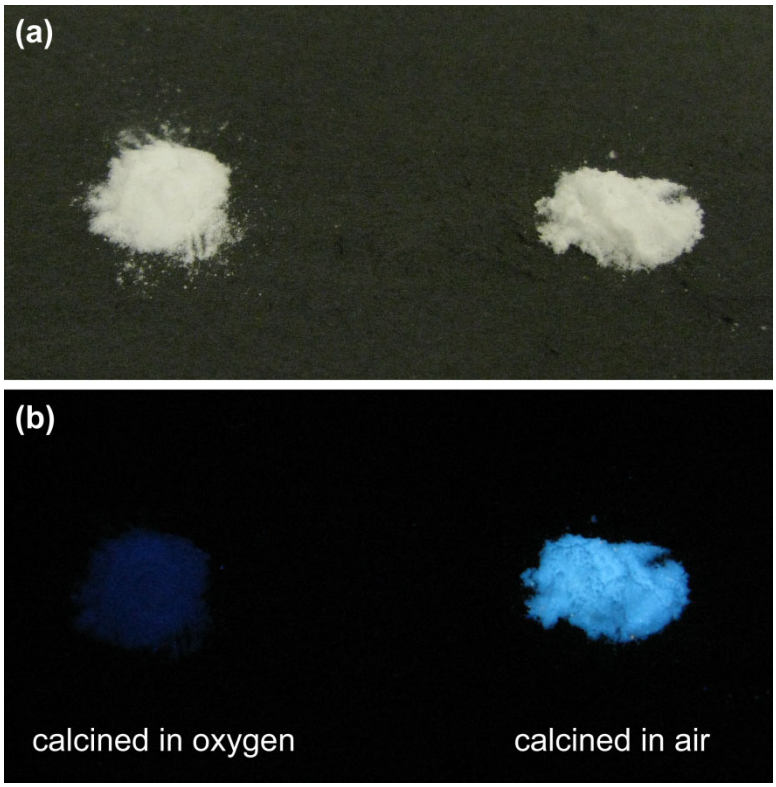

Fig. S8 Photographs taken (a) under ambient light and (b) under a hand-held ultraviolet lamp at 253.7 nm. The mesoporous silica samples were obtained from calcination at 600 °C in oxygen (left) and in air (right), respectively.

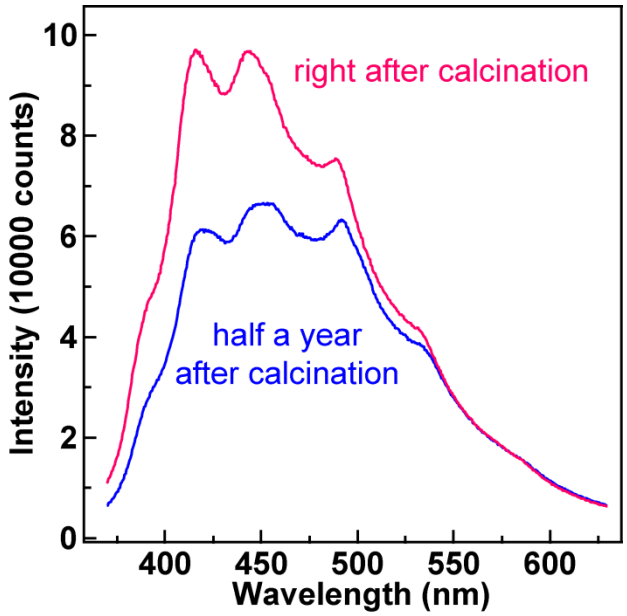

Fig. S9 PL spectra of the mesoporous silica recorded right after calcination (pink) and half a year after calcination (blue). The calcination was performed at 600 °C.

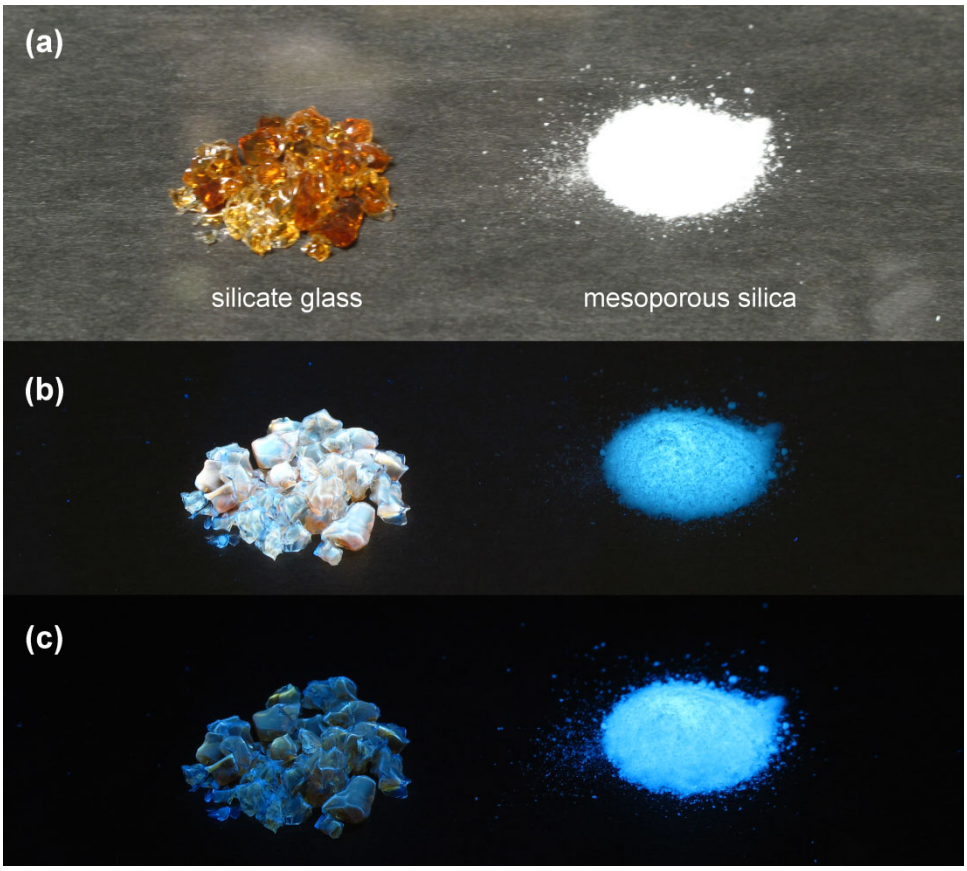

Fig. S10 Photographs of the silicate glass prepared according to the previously reported procedure (left) and our mesoporous silica (right). The photographs were taken (a) under ambient light, (b) under a hand-held ultraviolet lamp at 365 nm, and (c) under a hand-held ultraviolet lamp at 253.7 nm, respectively.

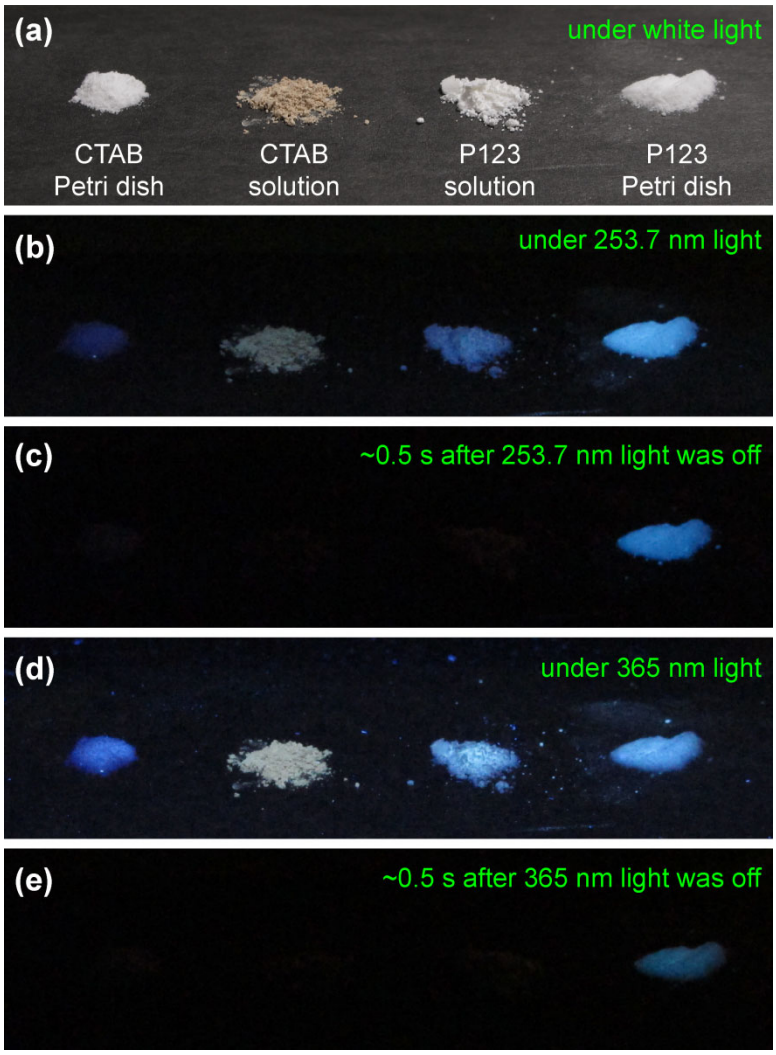

Fig. S11 Photographs of the mesoporous silica prepared with P123 and CTAB under different conditions. The photographs were recorded (a) under white light, (b) under a hand-held ultraviolet lamp at 253.7 nm, (c) ~0.5 s after the 253.7 nm light was turned off, (d) under a hand-held ultraviolet lamp at 365 nm, and (e) ~0.5 s after the 253.7 nm light was turned off, respectively.