Supporting Information

Nano-porous Hollow $Li_{0.5}La_{0.5}TiO_3$ Spheres and Electronic Structure Modulation for Ultra-fast H_2S Detection

Ningchong Zheng[1,2], Xiaofeng Li[1,2], Shen Yan[1,2], Qian Wang[1,2,3], Rui Qiao[1,2], Junhua Hu* [1,2,3], Jiajie Fan[1,2], Guoqin Cao**[1,2,4], Guosheng Shao***[1,2,3]

[1]Henan Province Industrial Technology Research Institute of Resources and Materials & School of Materials Science and Engineering, Zhengzhou University, Zhengzhou 450001, China

[2]State Center for International Cooperation on Designer Low-carbon & Environmental Materials (CDLCEM), Zhengzhou University, 100 Kexue Avenue, Zhengzhou 450001, China

[3]Zhengzhou Materials Genome Institute (ZMGI), Zhongyuanzhigu, Xingyang 450100, China

[4]Institute for Renewable Energy and Environmental Technologies, University of Bolton, Bolton BL3 5AB, UK

Corresponding author: *hujh@zzu.edu.cn; **gc10mpo@bolton.ac.uk, **gsshao@zzu.edu.cn;

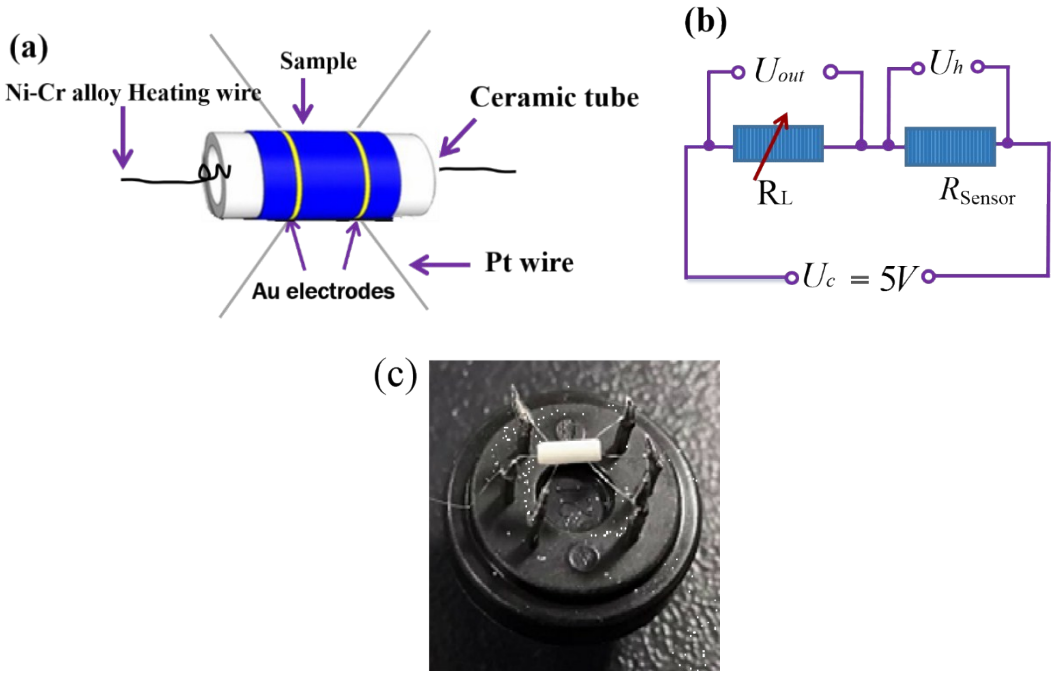

Fig. S1 (a) Schematic diagram of the H_2S sensors. (b) Equivalent circuit diagram of the gas-sensing test system for H_2S-sensing evaluation. (c) Picture of the assembled device.

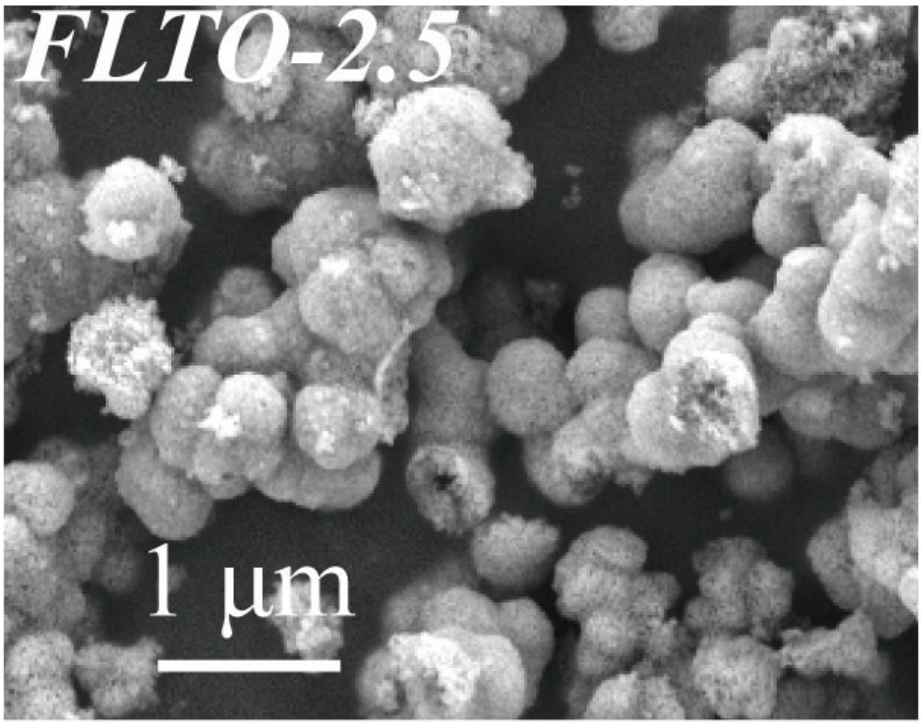

Fig.S2 SEM image of FLTO-2.5

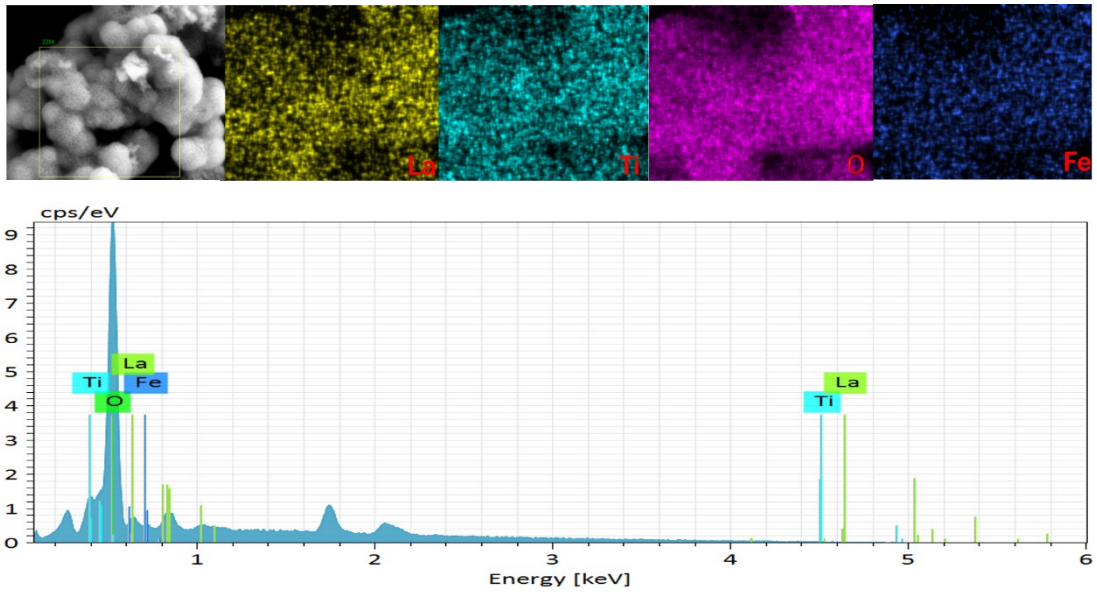

Fig. S3 SEM and EDS images of FLTO-7.5.

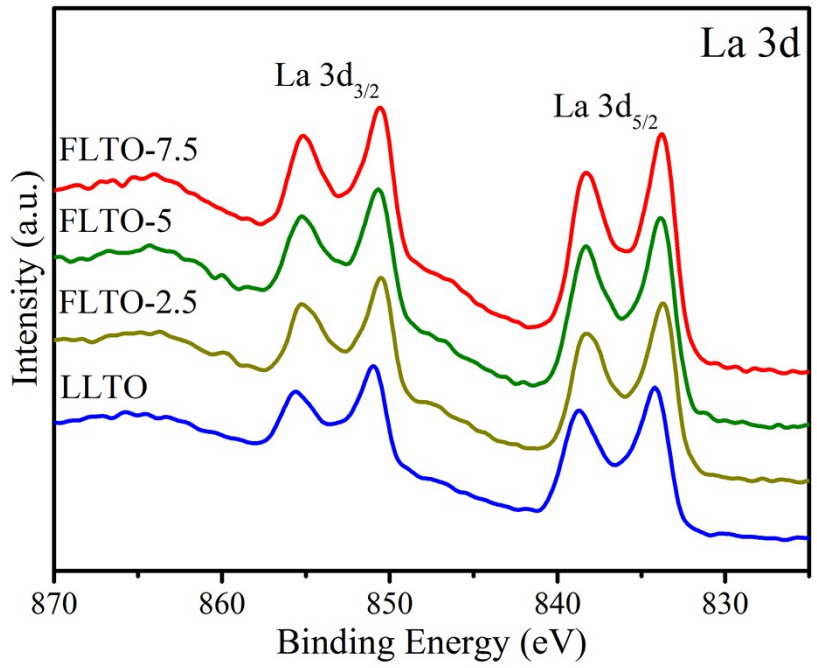

Fig. S4 La 3d spectrum of LLTO and FLTO-2.5, FLTO-5, FLTO-7.5.

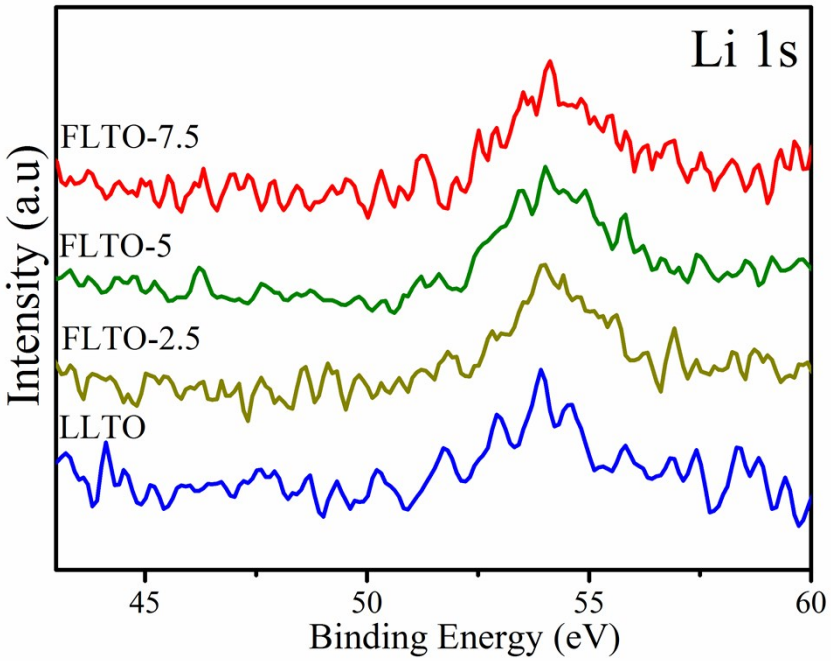

Fig. S5 Li 1s spectrum of LLTO and FLTO-2.5, FLTO-5, FLTO-7.5.

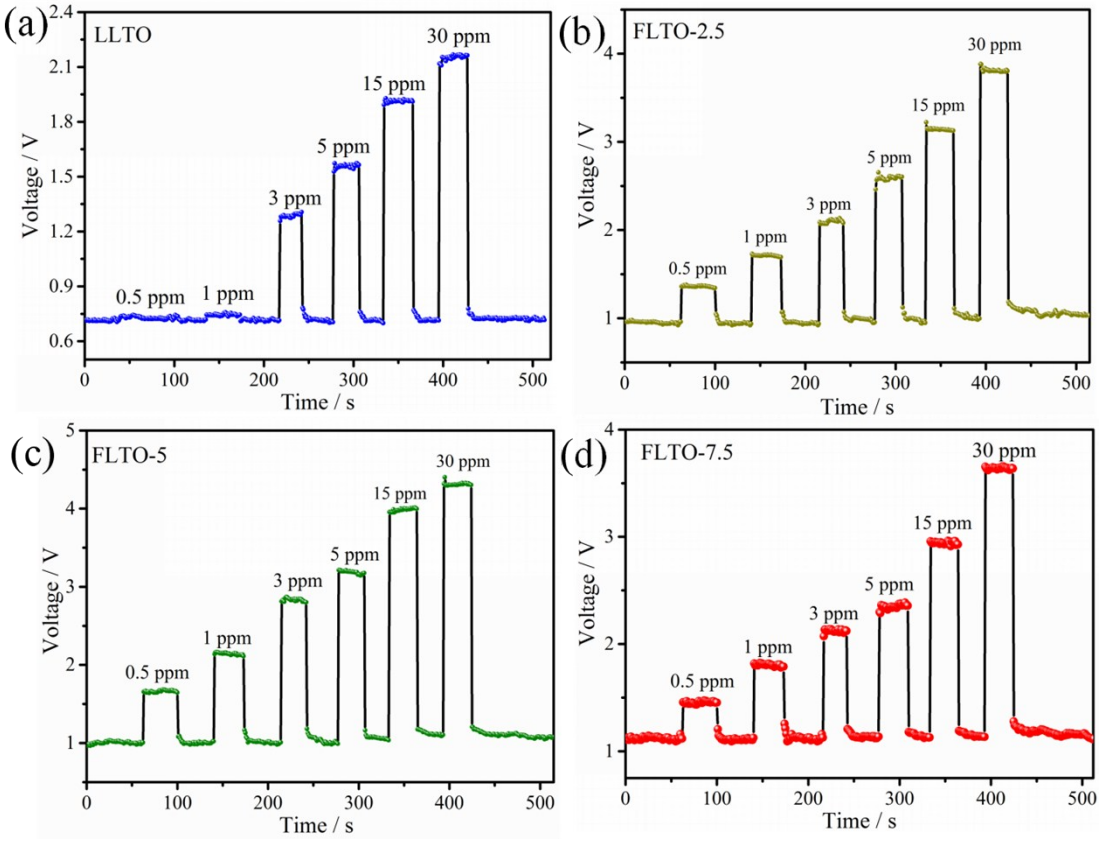

Fig. S6 H_2S sensing curves in the test system of all the samples at 300°C: (a) LLTO, (b) FLTO-2.5, (c) FLTO-5, (d) FLTO-7.5.

Table S1 Response and recovery time of the sensor at 100 ppm

LLTO	FLTO-2.5	FLTO-5	FLTO-7.5
1.8/2.7	2.9/3.6	0.9/2.7	2.8/4.5 s

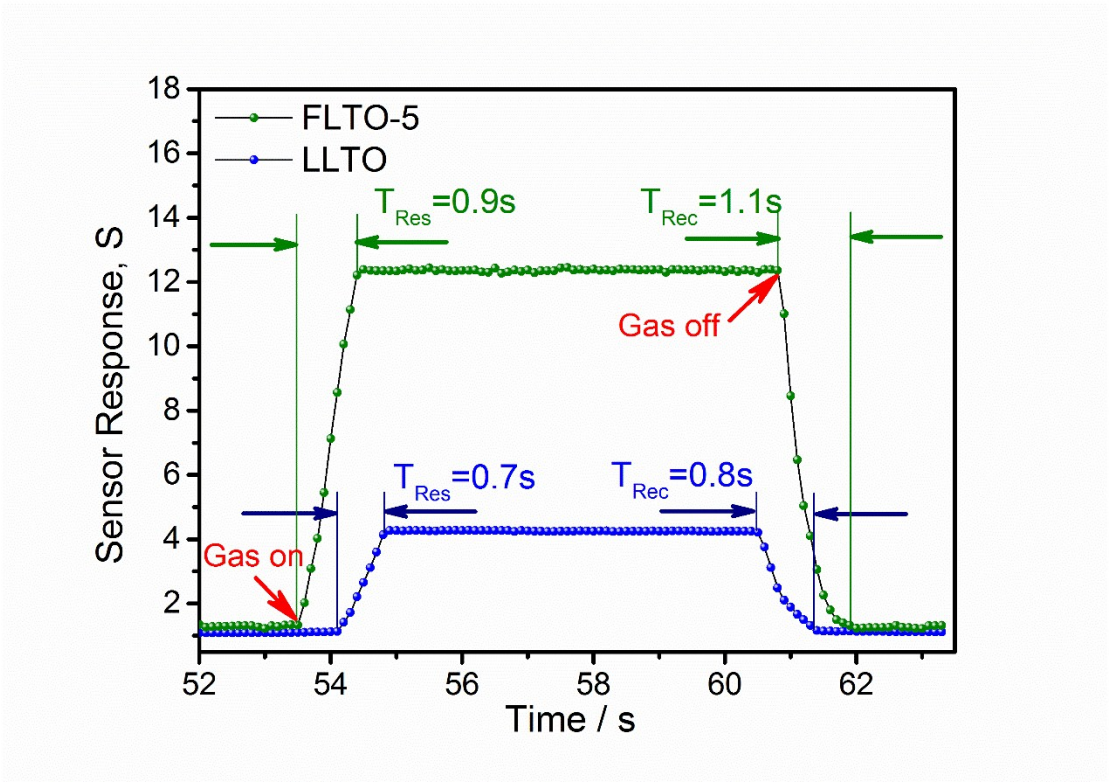

Figure S7. The time-resolution Response and Recovery time graph of LLTO and FLTO-5 sensor toward 30 ppm H_2S at 340 ^oC.

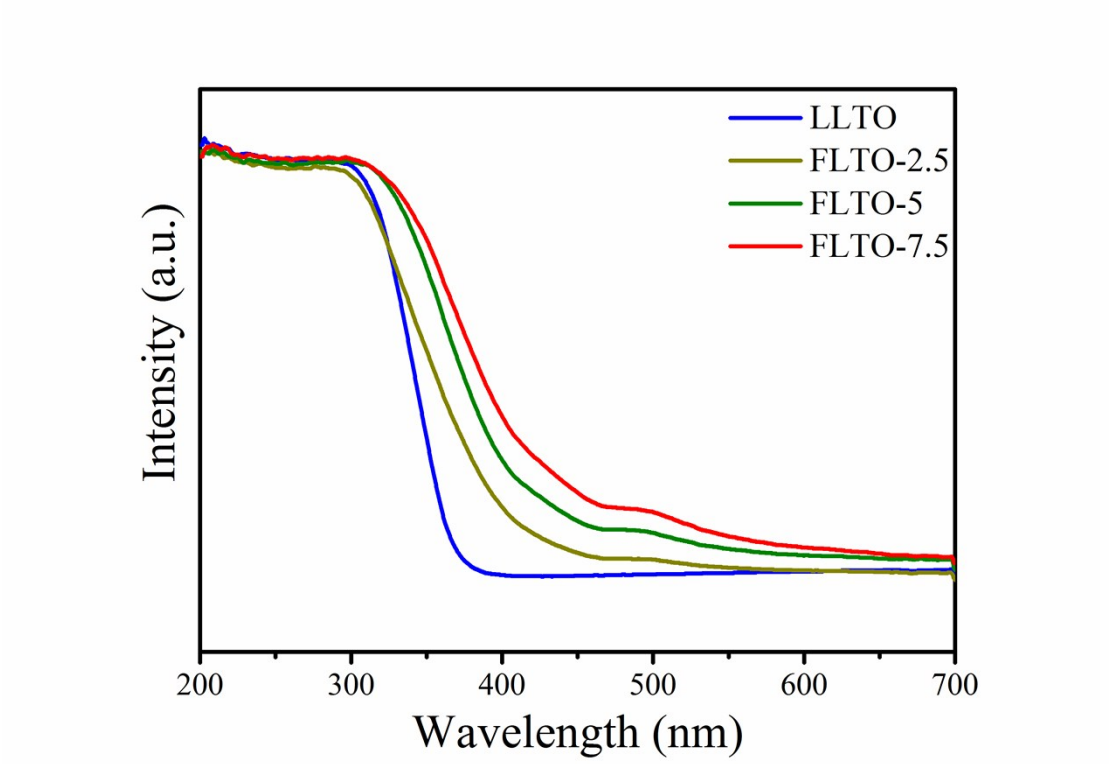

Fig. S8. The UV-Vis curves of LLTO and FLTO-2.5, FLTO-5 and FLTO-7.5 samples.

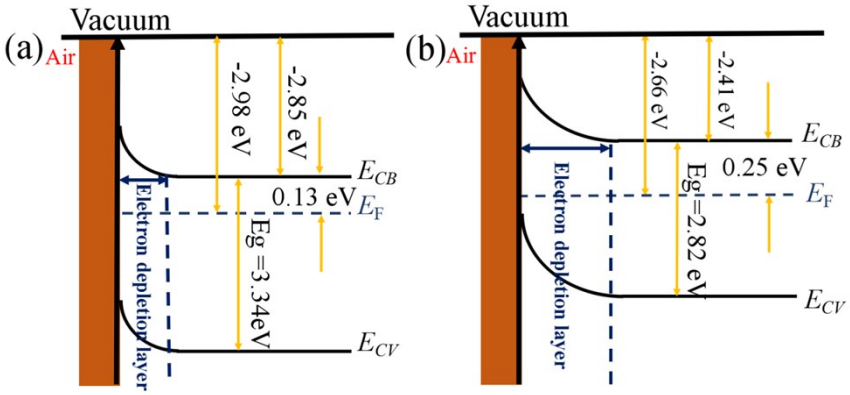

Fig. S9Exact band diagram of (a) LLTO and (b) FLTO-5.