## Supporting Information Laser-Direct-Writing of Molecular-like Ag<sub>m</sub><sup>x+</sup> Nanoclusters in Transparent Tellurite Glass for 3D Volumetric Optical Storage

Yaman Wu,<sup>a,c</sup> Hang Lin,<sup>\*a,b</sup> Renfu Li,<sup>a</sup> Shisheng Lin,<sup>a,b</sup> Chuxin Wu,<sup>a</sup> Qiugui Huang,<sup>a</sup> Ju Xu,<sup>a,b</sup> Yao Cheng,<sup>a,b</sup> Yuansheng Wang.<sup>\*a,b</sup>

<sup>a</sup> Key Laboratory of Optoelectronic Materials Chemistry and Physics, Key Laboratory of Design and Assembly of Functional Nanostructures, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, Fujian, 350002, P. R. China;

<sup>b</sup> Fujian Science & Technology Innovation Laboratory for Optoelectronic Information of China, Fuzhou, Fujian, 350108, P. R. China;

<sup>c</sup> University of Chinese Academy of Sciences, Beijing, 100049, P. R. China



Figure. S1 TEM images of the (a) TZN-0 and (b) TZN-5 samples.



Figure. S2 Temperature dependent (a) PL and (b) PLE spectra of the TZN-5-Laser sample.



Figure. S3 CLSM image of the surface of the laser spot in TZN-5-Laser sample. the photos are taken without (left) or with (right) 405 nm UV laser excitation.



Figure. S4 Raman spectra analyses on the B band and C band of the TZN-x glasses via Gaussian deconvolutions.



Figure. S5 Thermal imaging photograph on the TZN-5 glass upon laser irradiation.



Figure. S6 DSC analysis on the TZN-5 glass.



Figure. S7 The absorption spectra of the TZN-5 sample with laser irradiation for different number of shot times.



Figure. S8 PL spectra of TZN-x glasses (a) before and (b) after laser irradiation.