

## Supplementary Information

### Stretchable Light Scattering Display Based on Super Strong Liquid Crystalline Physical Gels with Special Loofah-like 3D gel networks

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#### 1. Schematic illustration of models of the photochemical phase transition

With the UV exposure, photosensitizer 2Azo2 has a trans-cis transition, and such photochemical disordering process could destroy the alignment of the host LC 5CB, which could develop into the nematic-to-isotropic phase transition of the host LC mixture at room temperature, so a transparent state is obtained as a result, as shown in Figure S2(b). While exposing the mixture to a visible light, the photosensitizer 2Azo2 is induced the cis-trans back-isomerization, so that the initial nematic phase of the host LC mixture can be recovered to show the original opaque state, as shown in Figure S2(a). Such a photo-optical behavior makes the azobenzene doped LCs an excellent system for a photo-controllable light scattering display.

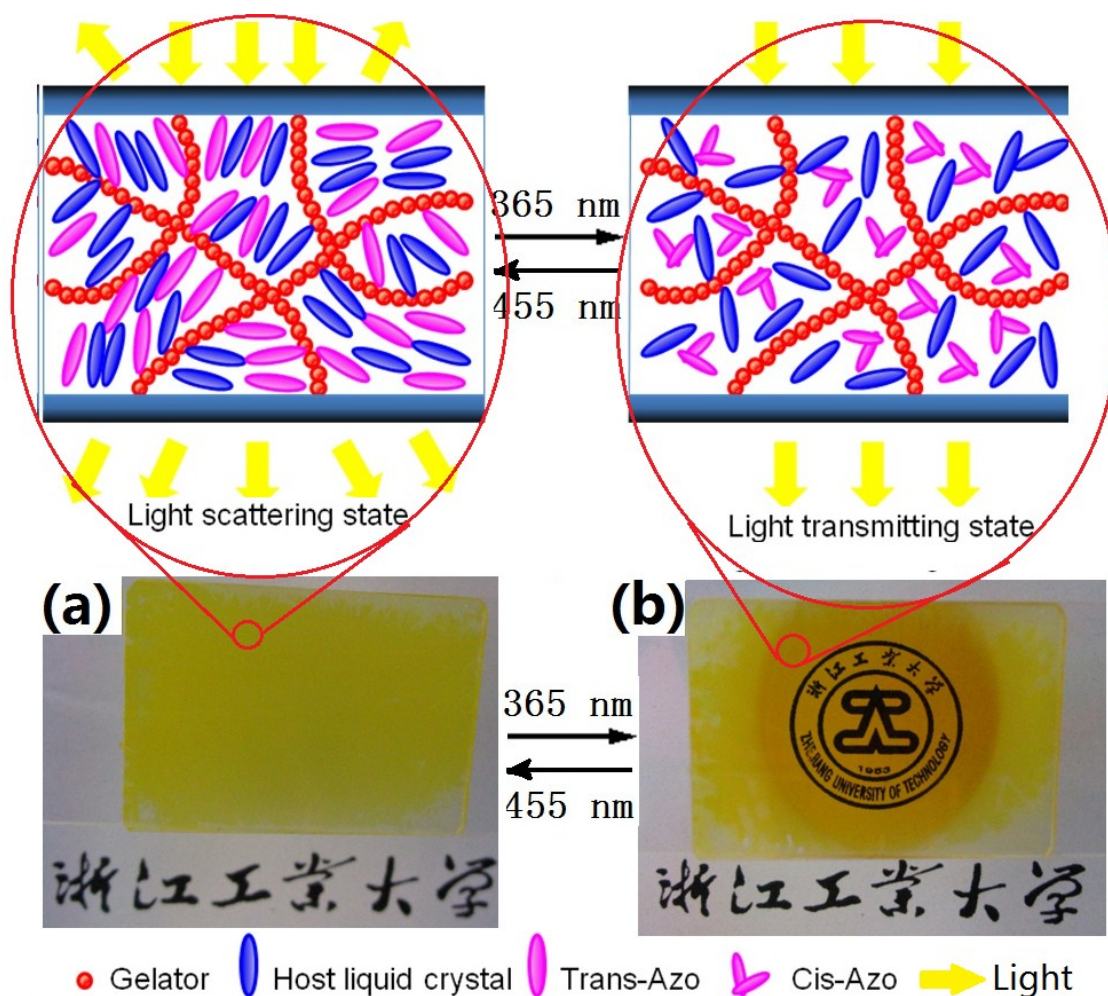
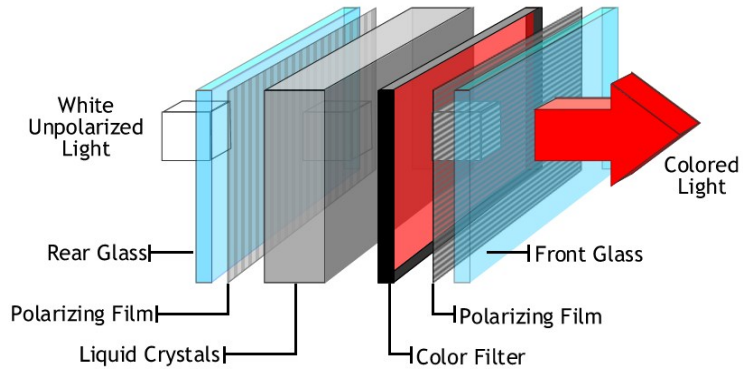


Figure S1 Schematic illustration of models of the photochemical phase transition

#### 2. Operating principle of Liquid Crystal Displays



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Figure S2 Operating principle of Liquid Crystal Displays<sup>1</sup>

### 3. The on/off cyclability test of the LC gel display device

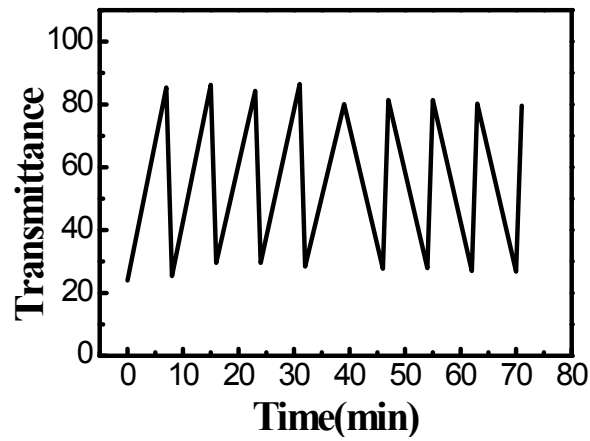


Figure S3 The transparency of UV-vis cyclability test of the LC gel display device

### 4. Larger size LC display

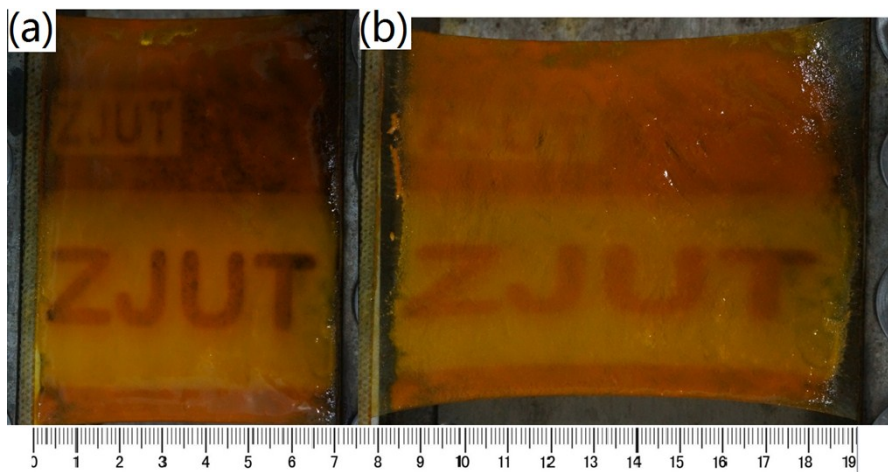


Figure S4 Larger sample ( $7.0 \times 9.4 \text{ cm}^2$ ) with about 10 times area of the sample in Figure 8 ( $3.5 \times 1.8 \text{ cm}^2$ ): (a) the initial state of the display with an effective length of 7.0 cm; (b) the LC display is stretched up to 145% of its original length with an effective length of 10.2 cm.

## References

1. CHEMSTIX , *Tech Reviews*, 2013, FRIDAY, **13**, <http://withfriendship.com/images/b/9673/lcd-pictures-of-liquid.png>