

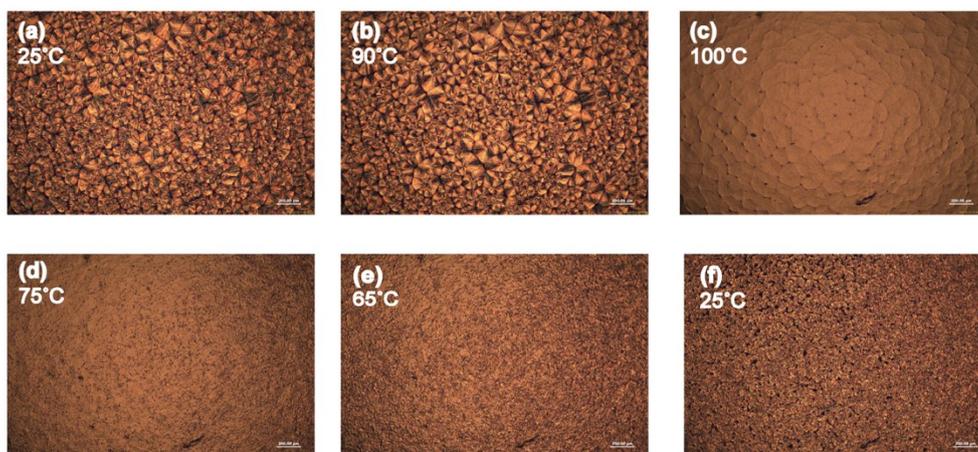
Electronic Supplementary Information for:

**Thermochromic, self-luminescent solid-solid phase  
change composite membrane from polyethylene  
glycol entanglement for thermal management, shape  
memory and information encryption**

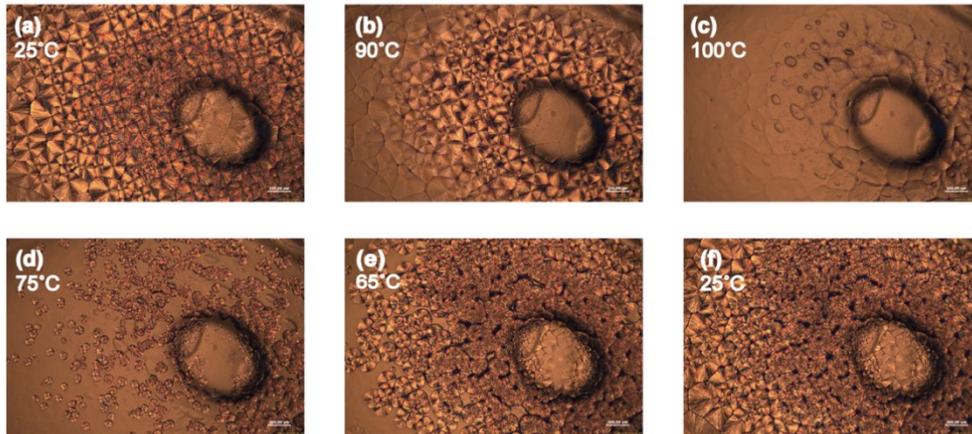
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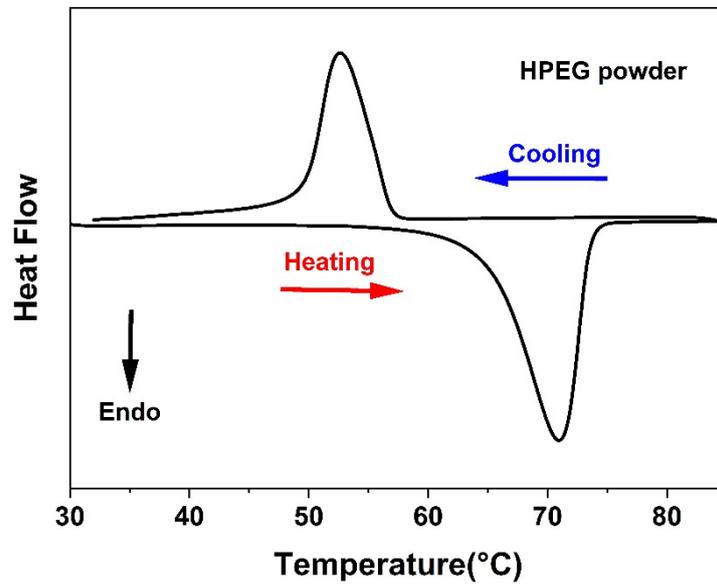
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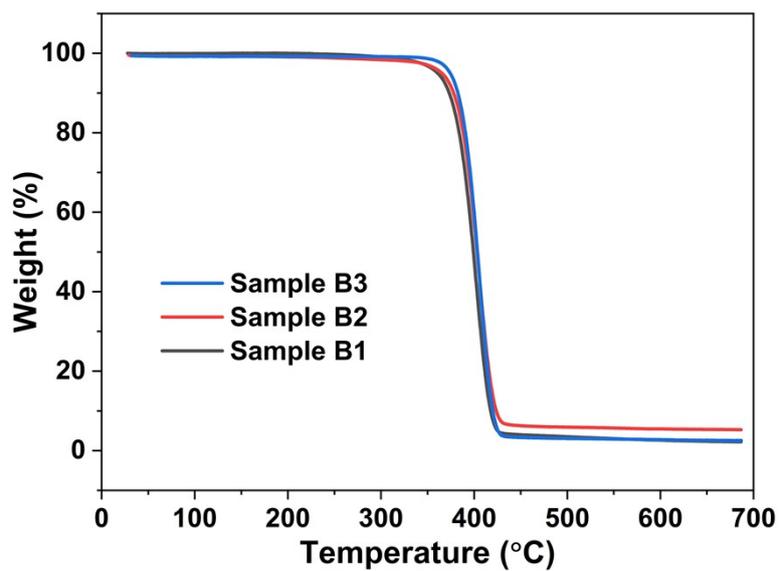
**Fig. S1.** POM images of sample A2 at the temperature of heating process (a) 25°C, (b) 90°C, (c) 100°C, and cooling process (d) 75°C, 65°C (e), (f) 25°C.



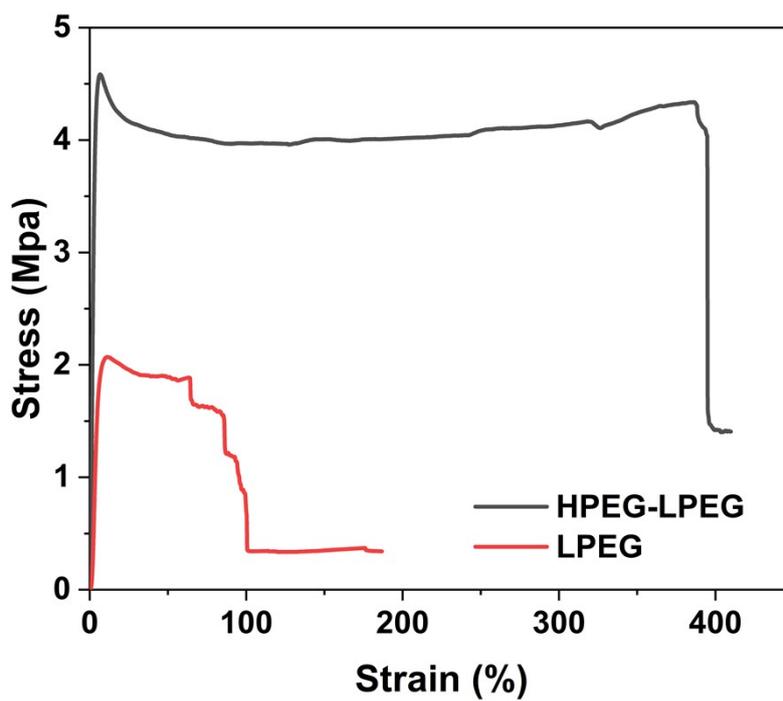
**Fig. S2.** POM images of sample C2 at the temperature of heating process (a) 25°C, (b) 90°C, (c) 100°C, cooling process (d) 75°C, (e) 65°C, (f) 25°C.



**Fig. S3.** DSC curve of pure HPEG powder.



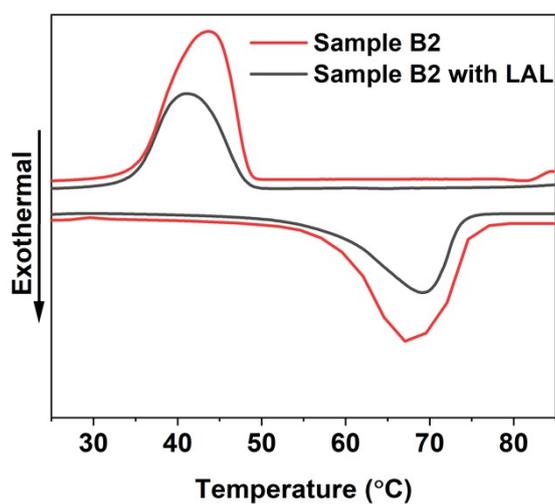
**Fig. S4.** TGA curves of Sample B1, B2, and B3.



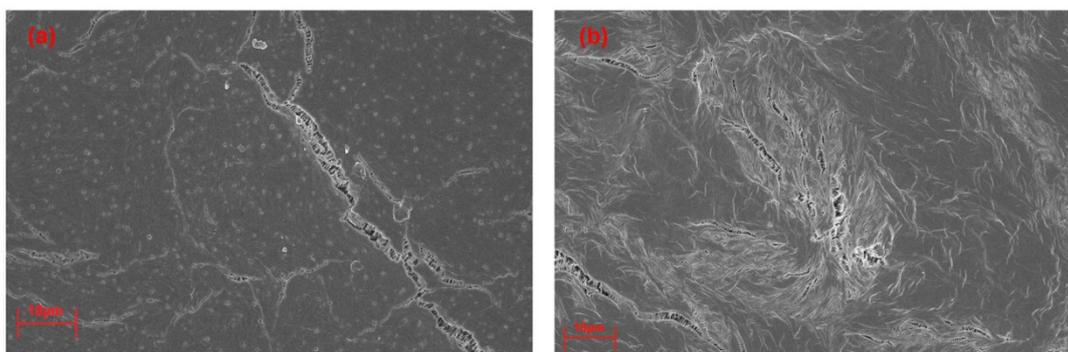
**Fig. S5.** Stress-strain curves of LPEG membrane and HPEG-LPEG membrane.



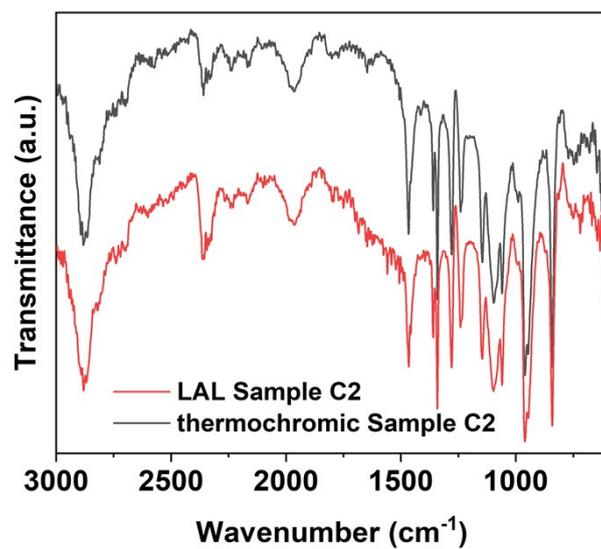
**Fig. S6.** Video of information encryption and decryption process of HPEG-LPEG solid-solid phase change membranes.



**Fig. S7.** DSC curves of HPEG-LPEG membrane curves of LPEG membrane and HPEG-LPEG membrane with LAL particles.



**Fig. S8.** SEM picture of HPEG-LPEG membrane (a) with and (b) without LAL particles.



**Fig. S9.** FT-IR curves of Sample C2 with LAL or thermochromic particles.