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## **Support Information**

Lower temperature and solvent dual response induced reversible information encryption and decryption hydrogels with host-guest recognition regulation

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Samples	N%	С%	Н%	Grafting degree
Ad-PNIPAm-1%	11.26	59.52	9.237	1.10%
Ad-PNIPAm-3%	10.98	60.58	8.794	2.83%
Ad-PNIPAm-5%	9.99	58.22	8.277	5.00%

Table S1. Elemental analysis results of Ad-PNIPAm



Fig. S1. SEM images of Ad-PNIPAm: (a)~(d) pore structure of composite hydrogel; (e)~(h) pore structure of composite hydrogel after soaking in absolute ethanol for 8 h.



Fig. S2. (a) TGA curves and (b) DTG curves of NIPAm, PNIPAm gel, 1% Ad-PNIPAm gel, 3% Ad-PNIPAm gel and 5% Ad-PNIPAm gel.



Fig. S3. (a) G' and G'' curves of Ad-PNIPAm gel/ $\beta$ -CD with temperature; (b) The changes of G' and G'' of composite hydrogels with temperature before and after host-guest recognition.



Fig. S4. (a) ethanol stimulus response rate, (b) total encryption duration, (c) transmittance and (d) physical images of 5% Ad-PNIPAm gel stored for 1, 7, 14 and 30 days, respectively.