1 **Supplementary material for**

2 **Construction of Liquid Crystal Biosensor based on $Fe_3O_4$ Nano-**

3 **signal Amplification and its Application in HCG Detection**

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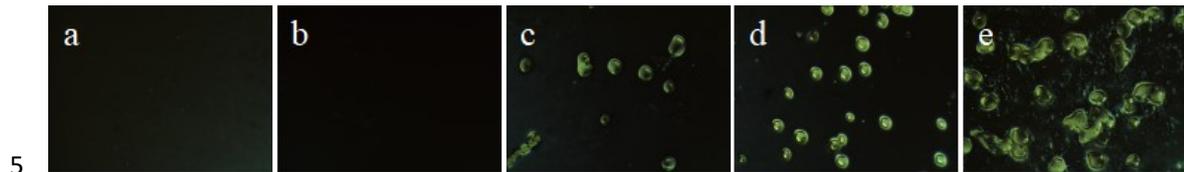
15 Xi'an, Shaanxi 710075

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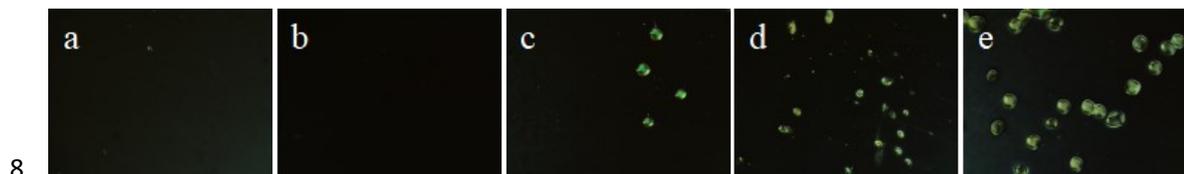
## 1. Optimization of the content of DMOAP



**Fig. S1** Optimization of optimum DMOAP content: (a) 1%, (b) 1.5%, (c) 2.0%, (d) 2.5%, (e) 3%.

## 2. Optimization of APTES and GA addition



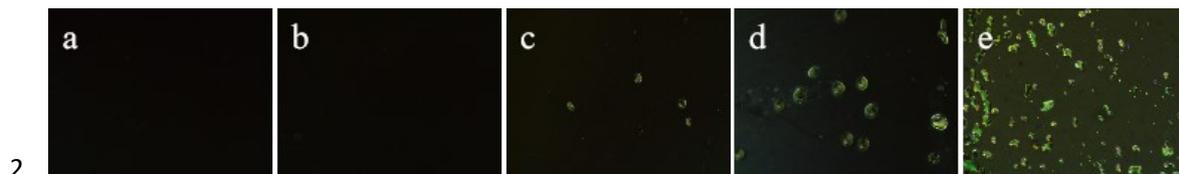**Fig. S2** Optimization of optimum APTES content: (a) 2.0%, (b) 4.0%, (c) 6.0%, (d) 8.0%, (e) 10.0%.



**Fig. S3** Optimization of optimum GA content: (a) 1.0%, (b) 1.5%, (c) 2.0%, (d) 2.5%, (e) 3.0%.

## 3. Optimization of the concentration of β-hCG



**Fig. S4** Optical imaging of LC cells prepared with different concentrations of β-hCG (a) 1.0, (b) 10, (c) 50, (d) 100, (e) 200 mIU/mL.

# 4. Optimization of detectable concentrations of Fe₃O₄-modified β-hCG



**Fig. S5** Optical imaging of LC cell prepared by different concentrations of $Fe_3O_4$ nanospheres modified β-hCG: (a) 1.0, (b) 10, (c) 50, (d) 100, (e) 200 mIU/mL.

# 5. Real sample
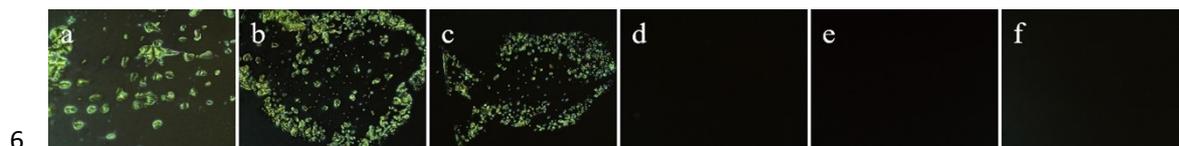


**Fig. S6** Analysis of the real sample of LC biosensors. (a-c) with HCG sample, (d-e) without HCG sample.

# 6. Specificity analysis



**Fig. S7** Analysis of the specificity of LC biosensors (a) LH, (b) FSH, (c) HCG.