Electronic Supporting Materials (ESM):

**A novel copper ion sensing fluorescent probe for fast detection of pyrophosphate and alkaline phosphatase**

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**Figures:**

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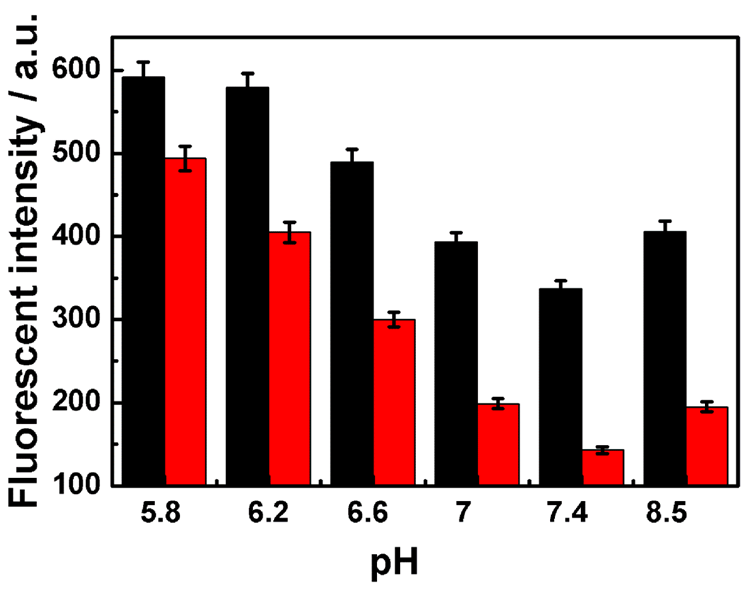
**Figure S1. 1H NMR of copper ion fluorescent probe.**

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**Figure S2. 13C NMR of copper ion fluorescent probe.**

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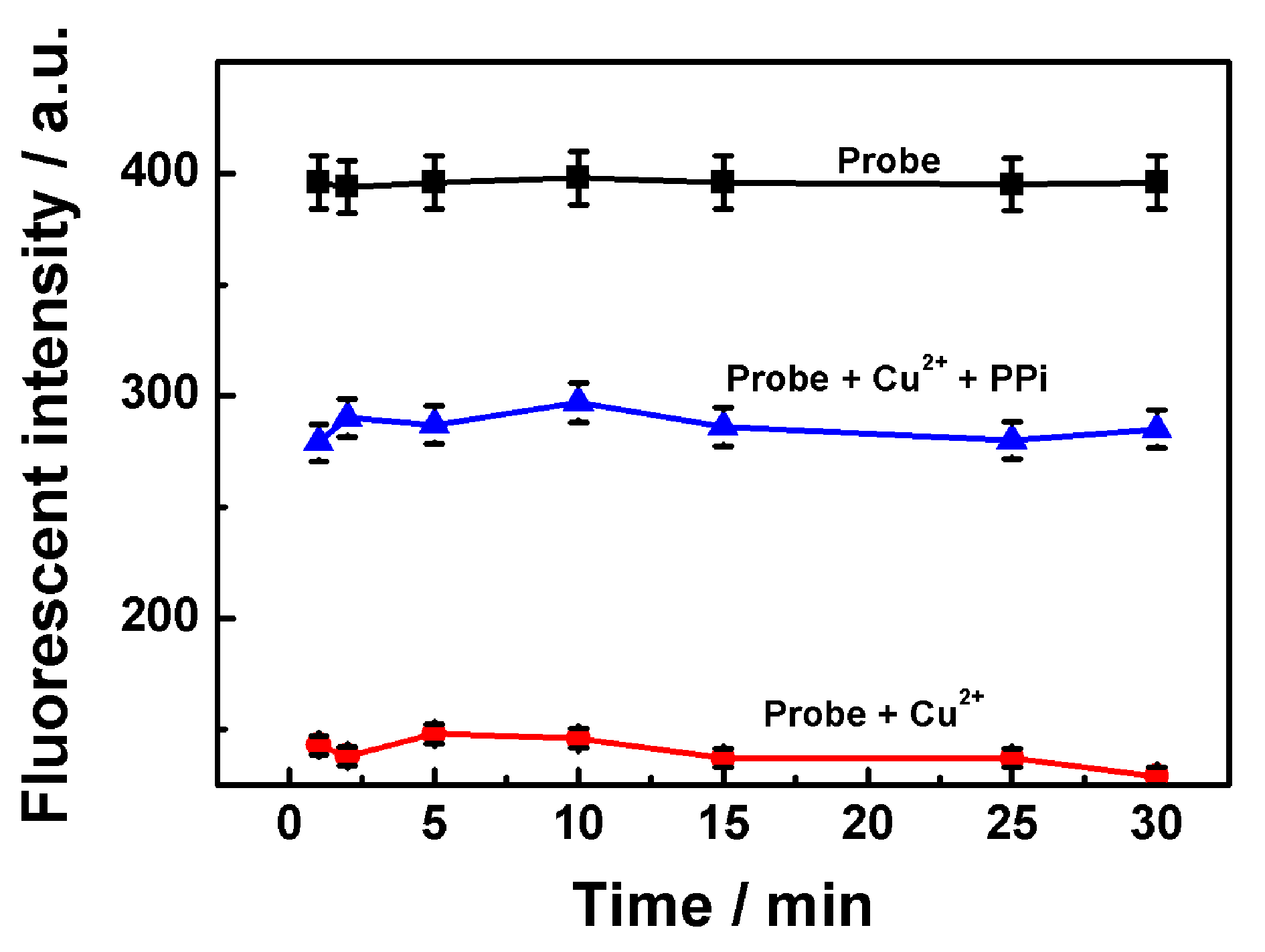
**Figure S3.** The effect of other coordination agent EDTA.Fluorescent spectra of the probe (red line), the probe with Cu2+ (blue line), the probe with EDTA and Cu2+ (blue line). *c*(probe, mM): 0.05; *c*(EDTA, mM): 500; *c*(Cu2+, mM): 0.5; 40 mMM phosphate buffer solutions pH 7.4; **ex: 316 nm; **em: 445 nm.

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**Figure S4.** The effect of pH on the reaction of the probe with Cu2+. Black columns represent fluorescence intensity of the probe; Red columns represent fluorescence intensity of the probe with Cu2+. 40 mM phosphate buffer solution pH: 5.8, 6.2, 6.6, 7.0, 7.4 and 8.5; *c*(probe, nM): 50; *c*(Cu2+, nM): 300; **ex: 316 nm; **em: 445 nm. All error bars represent standard deviations of the three measurements.

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**Figure S5.** The effect of temperature on the reaction of the probe with Cu2+. Black columns represent fluorescence intensity of the probe; Red columns represent fluorescence intensity of the probe with Cu2+. Temperature(oC): 25 (room temperature), 37, 50. *c*(probe, nM): 50; *c*(Cu2+, nM): 300; 40 mM phosphate buffer solution: pH 7.4;**ex: 316 nm; **em: 445 nm. All error bars represent standard deviations of the three measurements.

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**Figure S6** Stability of fluorescent detection of PPi and Cu2+ using this probe. Black line represents fluorescent intensity of the probe; Red line represents fluorescent intensity of the probe with Cu2+ mixture. Blue line represents fluorescent intensity of the probe with Cu2+ mixture after the addition of PPi. Time (min): immediately, 2, 5, 10, 15, 25 and 30. *c*(probe, nM): 50; *c*(PPi, mM): 40; *c*(Cu2+, nM): 500; 40 mM phosphate buffer solution: pH 7.4.**ex: 316 nm;**em: 445 nm. All error bars represent standard deviations of the three measurements.

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**Figure S7.** The effect of temperature on fluorescent “turn-on” detection of PPi using the probe. Black columns represent fluorescent intensity of the probe; Red column represents fluorescent intensity of the probe with Cu2+; Blue columns represent fluorescent intensity of the probe with Cu2+ and PPi. Temperature (oC): 25 (room temperature), 37 and 50; *c*(probe, nM): 50; *c*(Cu2+, nM): 500; *c*(PPi, M): 40; 40 mM phosphate buffer solution: pH 7.4. **ex: 316 nm; **em: 445 nm. All error bars represent standard deviations of the three measurements.

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**Figure S8.** The selectivity of fluorescent “turn-on” detection of PPi using the probe. The concentrations of PPi, Cl-, NO3-, CO32-, PO43- and SO42- are 40 μM. *c*(probe, nM): 50; *c*(Cu2+, nM): 500; 40 mM phosphate buffer solution: pH 7.4. **ex: 316 nm; **em: 445 nm. All error bars represent standard deviations of the three measurements.