Electronic Supplementary Material (ESI) for New Journal of Chemistry.


# High photoluminescence sensor for selective detection of cartap by functionalized VBimBF$_4$B ionic liquid-strengthened sulfur-doped carbon nanodots

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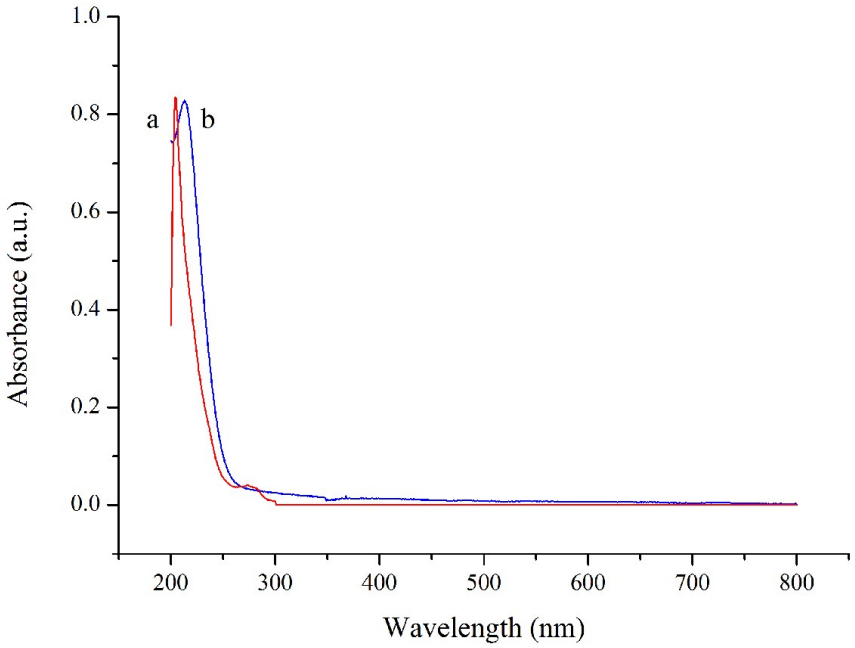


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g. S1 The ultraviolet absorption spectra of CP (a) and S-Cdots (b).

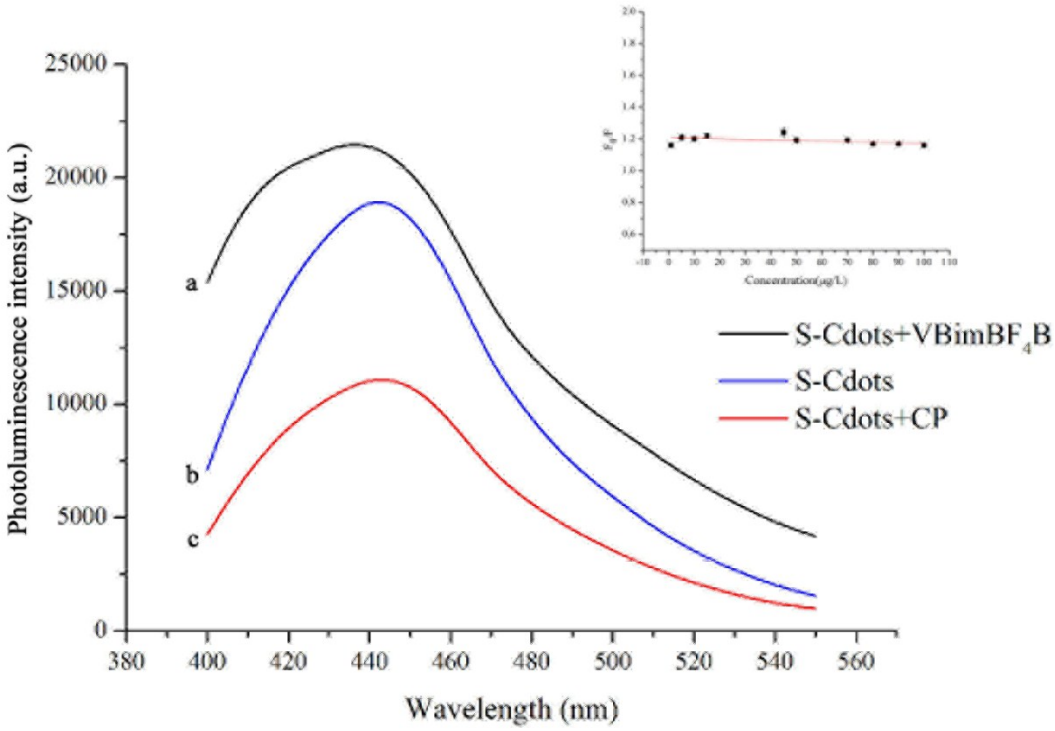



Fig. S2 FL spectra of the control polymer (a), $VBimBF_4B$-strengthened S-Cdots (b), $VBimBF_4B$-strengthened S-Cdots after adding CP (c).

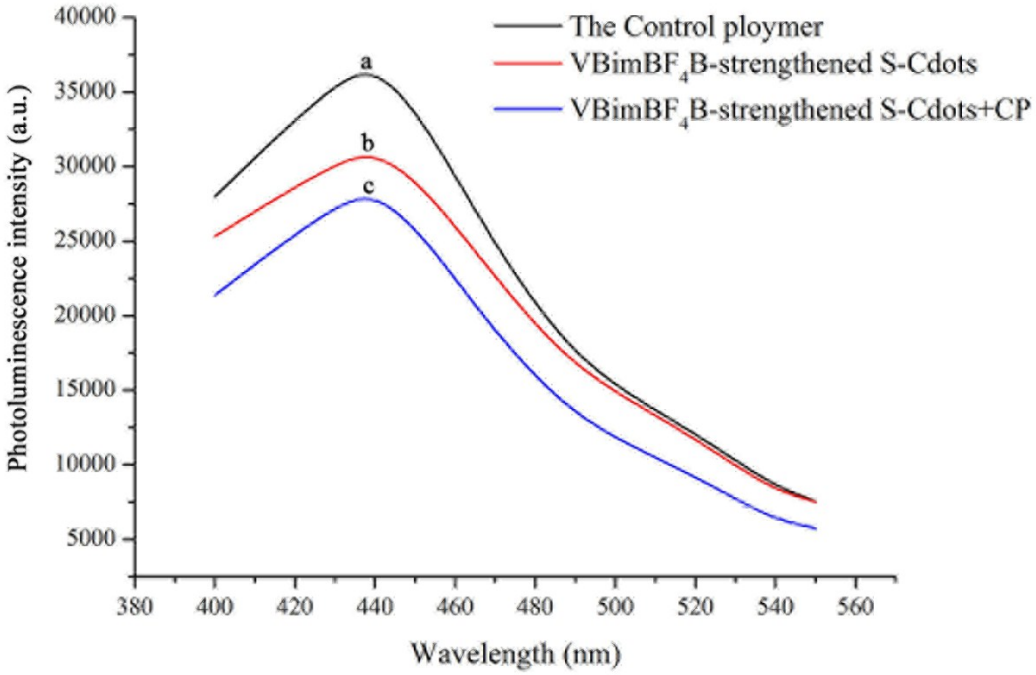



Fig. S3 FL spectra of the S-Cdots before (b) and after the addition of $VBinBF_4B$ (a) and CP (c). The inset presents the calibration plots for CP on S-Cdots.

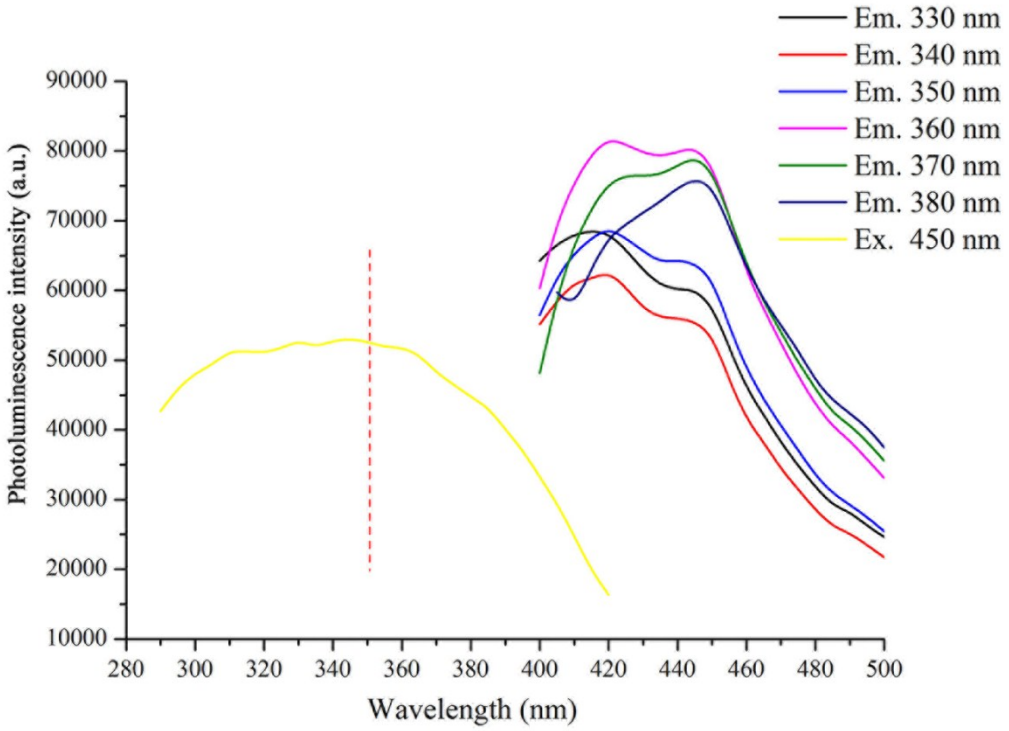
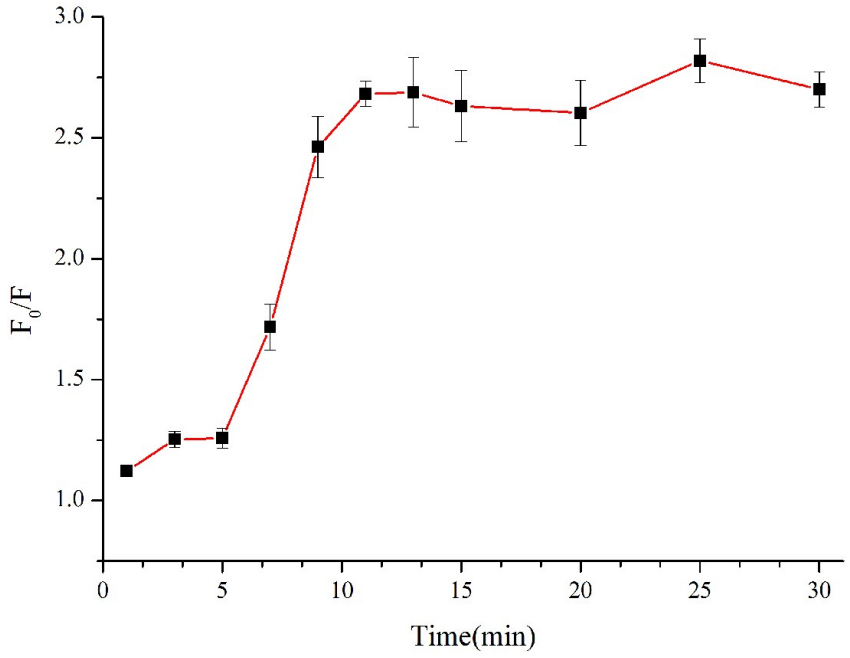



Fig. S4 The photoluminescence emission spectra of the $VBimBF_4B$ with the different excitations.

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ig. S5 Adsorption time of CP (0.1 mg/L) on VBimBF$_4$B-strengthened S-Cdots.

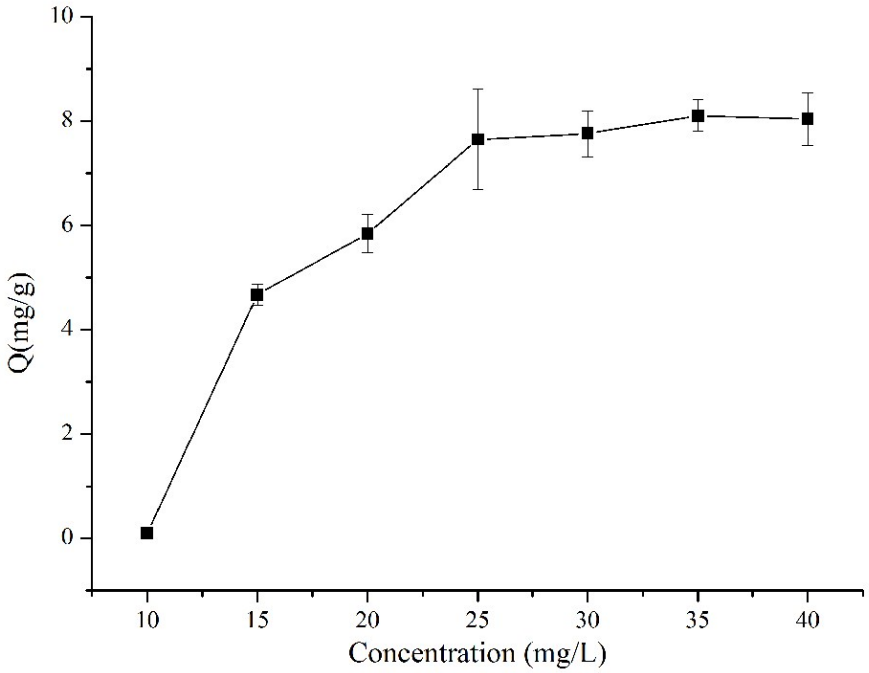


Fig. S6 Adsorption capacity of VBimBF$_4$B-strengthened S-Cdots.

Table S1 Optimization of the molecular ratio of cartap and $VBimBF_4B$/MAA.

| Cartap | $VBimBF_4B$ | MAA | EGDMA | $K_{SV}$ | $K^*_{SV}$ | $K_{SV}/K^*_{SV}$ |
|---|---|---|---|---|---|---|
| 1 | 2 | 2 | 5 | 0.0065±0.0001 | 0.0056±0.0005 | 1.14±0.02[a] |
| 1 | 3 | 3 | 7.5 | 0.0112±0.0001 | 0.0056±0.0005 | 2.02±0.03[b] |
| 1 | 4 | 4 | 10 | 0.0145±0.0003 | 0.0056±0.0005 | 2.63±0.05[c] |
| 1 | 5 | 5 | 12.5 | 0.0154±0.0001 | 0.0056±0.0005 | 2.74±0.01[c] |
| 1 | 6 | 6 | 15 | 0.0154±0.0001 | 0.0056±0.0005 | 2.73±0.03[c] |

*K*sv is the slope of the curve between the analyte concentrations and photoluminescence response in $VBimBF_4B$-strengthened S-Cdots and $K^*_{SV}$ is the slope of the curve between the analyte concentrations and photoluminescence response in the control groups.

Table S2 Optimization of the molecular ratio of EGDMA.

| Cartap | $VBimBF_4B$ | MAA | EGDMA | $K_{SV}$ | $K^*_{SV}$ | $K_{SV}/K^*_{SV}$ |
|---|---|---|---|---|---|---|
| 1 | 4 | 4 | 5 | 0.0079±0.003 | 0.0053±0.0003 | 1.49±0.06[a] |
| 1 | 4 | 4 | 10 | 0.0145±0.0002 | 0.0056±0.0005 | 2.63±0.05[b] |
| 1 | 4 | 4 | 15 | 0.0085±0.0005 | 0.0054±0.0004 | 1.58±0.08[a] |
| 1 | 4 | 4 | 20 | 0.0068±0.0002 | 0.0049±0.001 | 1.38±0.04[c] |

*K*sv is the slope of the curve between the analyte concentrations and photoluminescence response in $VBimBF_4B$-strengthened S-Cdots and $K^*_{SV}$ is the slope of the curve between the analyte concentrations and photoluminescence response in the control groups.

Table S3 Spiked recovery results for the determination of cartap in tap water.

| Actual concentration[a] | Detected concentration (mean，n=3) | Recovery (%) |
|---|---|---|
| 10 | 8.84 | 88.38±0.004 |
| 30 | 23.25 | 77.48±0.053 |
| 50 | 49.34 | 98.68±0.404 |
| 70 | 58.60 | 83.71±0.034 |

[a] The concentration unit is μg/L