

Supporting Information for

Yttrium (III) coordination polymer micro/nanospheres with single-ligand and dual-ligand

The centrifugation and washing are a step of obtaining compounds. The solution was added to a sterile centrifuge tube with volume of 15 ml after cooling. After centrifugation the supernatant was discarded to collect precipitate, then which was mixed 10ml distilled water. After centrifugation repeating the steps at 2 times and with ethanol at 3 times.

Vanillin was characterized by FI-IR: 3145, 1662, 1585, 1508, 1463, 1427, 1371, 1298, 1263, 1198, 1151, 1122, 1026, 858, 812, 730, 630, 590.

Sample 1 Y-CP micro/nanospheres were prepared for this time. In a typical procedure, 0.3 mmol of vanillin and asparagine 0.3 mmol were placed in a 25 ml Teflon-lined stainless-steel autoclave. Then it was dissolved in 10 ml of distilled water under magnetic stirring. Then, 0.5 mmol Y^{3+} was added to the above solution. The autoclave was sealed and heated at 150°C for 24 h. The final products were collected by centrifugation and washed several times with ethanol and distilled water. Finally, the precipitate was dried at 60 °C for 8 h. FI-IR: 1441, 1568. XRD: 11.77, 13.19, 16.95, 19.18, 26.54, 27.91, 30.95, 34.39, 36.98, 42.44, 43.32, 46.00, 48.42, 54.45.

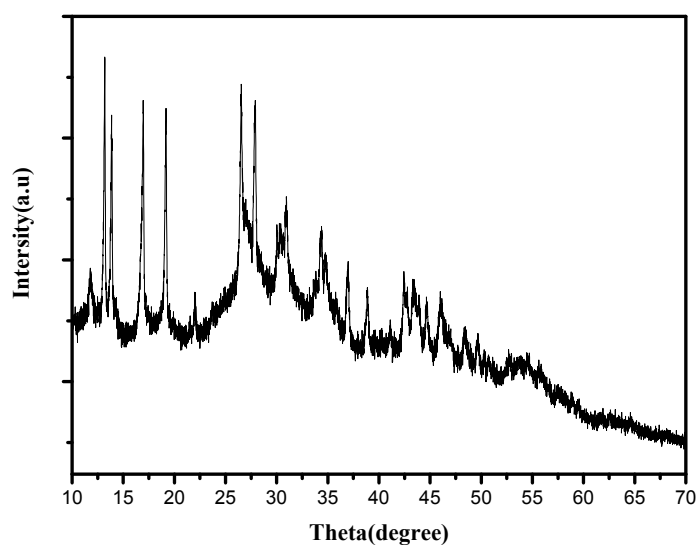
Sample 2 Following the synthetic procedure of Sample 1. Sample 1 0.3 mmol of vanillin and asparagine 0.3 mmol were used but the Y^{3+} was 0.2 mmol. FI-IR: 667, 1441, 1568. XRD: 11.79, 13.89, 16.77, 19.21, 26.63, 30.47, 33.84, 34.87, 42.65, 43.56, 46.10, 48.64, 53.65, 54.64.

1 Sample 3 Following the synthetic procedure of Sample 1. Sample 1 0.3 mmol of
2 vanillin and asparagine 0.3 mmol were used but the Y^{3+} was 0.4 mmol. FI-IR: 665,
3 1435, 1543. XRD: 11.77, 13.90, 16.69, 19.17, 26.95, 30.37, 33.82, 34.79, 42.51, 43.50,
4 46.01, 48.39, 53.76, 55.84.

5 Sample 4 Following the synthetic procedure of Sample 1. Sample 1 0.3 mmol of
6 vanillin and asparagine 0.3 mmol were used but the Y^{3+} was 0.6 mmol. FI-IR: 663,
7 1441, 1568. XRD: 11.76, 13.83, 16.91, 19.14, 26.51, 30.30, 33.80, 34.90, 42.56, 43.44,
8 46.03, 48.41, 53.77, 55.87.

9 Sample 5 Following the synthetic procedure of Sample 1. Sample 1 0.3 mmol of
10 vanillin was used but no asparagine and the Y^{3+} was 0.3 mmol. XRD: 11.71, 13.11,
11 16.85, 19.04, 26.46, 30.79, 33.83, 42.49, 43.52, 45.97, 53.47, 54.73.

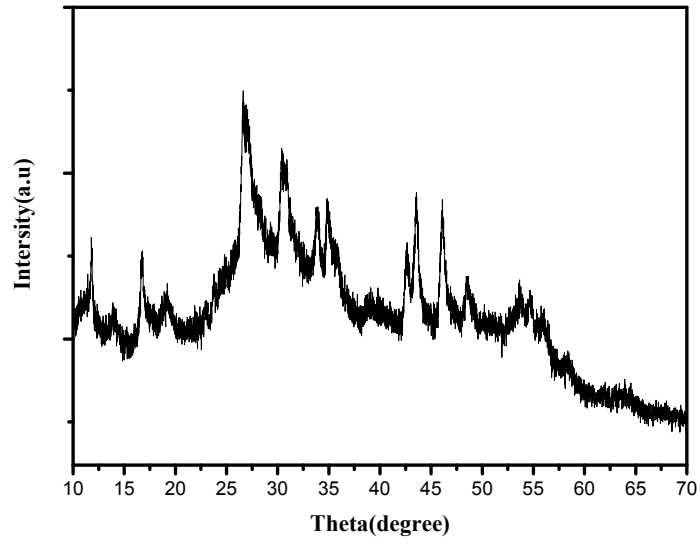
12 It is can be seen that the five samples patterns of XRD are similar (Fig 1, Fig 2, Fig
13 3, Fig 4, Fig 5).



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Fig 1 Sample 1 patterns

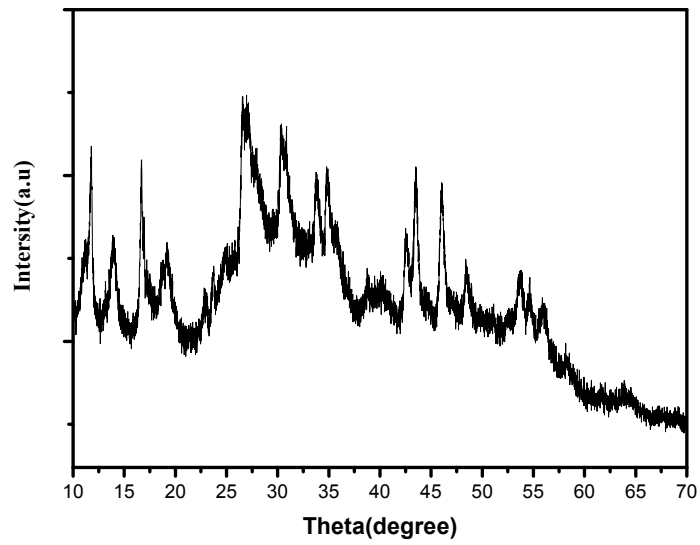


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Fig 2 Sample 2 patterns

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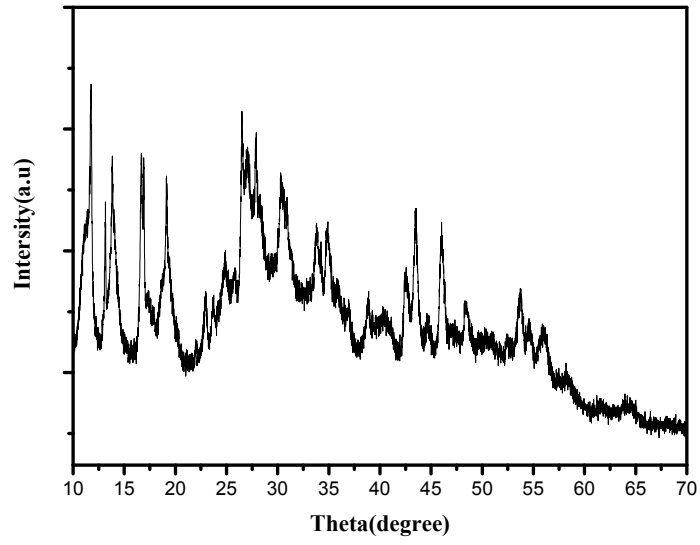


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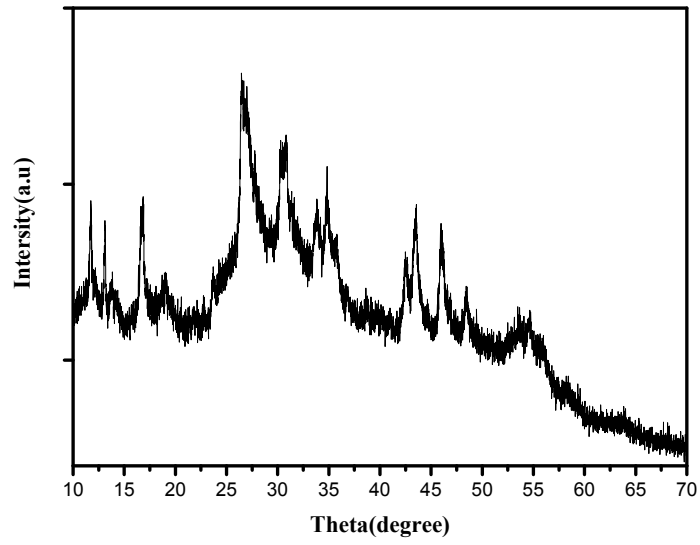
Fig 3 Sample 3 patterns

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Fig 4 Sample 4 patterns



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Fig 5 Sample 5 patterns