

Supporting Information for
**A Series of New Rare Earth Sulfates: A detail Study Based
on Lanthanide Contraction and Dual Organic-amines
Templating Effects**

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Table S1 Selected bond lengths (Å) for compounds 3a, 3b, 5a, 5b, 5d, 5e, 5f.

| 3a | | | | | |
|--------------|----------|--------------|----------|--------------|----------|
| Eu(1)-O(11) | 2.400(3) | Eu(1)-O(3) | 2.453(3) | Eu(1)-O(6) | 2.478(3) |
| Eu(1)-O(5)#1 | 2.443(3) | Eu(1)-O(7) | 2.462(3) | Eu(1)-O(2)#2 | 2.488(3) |
| Eu(1)-O(4) | 2.452(3) | Eu(1)-O(1) | 2.470(3) | Eu(1)-O(8)#1 | 2.513(3) |
| 3b | | | | | |
| Gd(1)-O(11) | 2.389(4) | Gd(1)-O(5)#1 | 2.438(3) | Gd(1)-O(6) | 2.469(3) |
| Gd(1)-O(4) | 2.435(3) | Gd(1)-O(1) | 2.454(3) | Gd(1)-O(2)#2 | 2.475(3) |
| Gd(1)-O(3) | 2.437(3) | Gd(1)-O(7) | 2.468(4) | Gd(1)-O(8)#1 | 2.511(3) |
| 5a | | | | | |
| Dy(1)-O(9)#1 | 2.297(5) | Dy(1)-O(6) | 2.382(5) | Dy(1)-O(1) | 2.408(5) |
| Dy(1)-O(3) | 2.313(5) | Dy(1)-O(5) | 2.386(5) | Dy(1)-O(8) | 2.452(5) |
| Dy(1)-O(2) | 2.371(5) | Dy(1)-O(7) | 2.398(5) | | |
| 5b | | | | | |
| Ho(1)-O(8) | 2.289(3) | Ho(1)-O(7) | 2.369(3) | Ho(1)-O(1) | 2.404(3) |
| Ho(1)-O(3)#1 | 2.297(3) | Ho(1)-O(4) | 2.376(3) | Ho(1)-O(9) | 2.453(3) |
| Ho(1)-O(2) | 2.358(3) | Ho(1)-O(6) | 2.388(3) | | |
| 5d | | | | | |
| Tm(1)-O(9)#1 | 2.258(4) | Tm(1)-O(7) | 2.367(4) | Tm(1)-O(6) | 2.336(4) |
| Tm(1)-O(3) | 2.271(4) | Tm(1)-O(1) | 2.385(4) | Tm(1)-O(5) | 2.347(4) |
| Tm(1)-O(2) | 2.332(4) | Tm(1)-O(8) | 2.431(4) | | |
| 5e | | | | | |

| | | | | | |
|--------------|----------|------------|----------|------------|----------|
| Yb(1)-O(9)#1 | 2.258(5) | Yb(1)-O(6) | 2.334(5) | Yb(1)-O(1) | 2.380(5) |
| Yb(1)-O(3) | 2.275(5) | Yb(1)-O(5) | 2.348(5) | Yb(1)-O(8) | 2.429(5) |
| Yb(1)-O(2) | 2.326(5) | Yb(1)-O(7) | 2.364(5) | | |
| 5f | | | | | |
| Lu(1)-O(9)#1 | 2.244(3) | Lu(1)-O(6) | 2.324(3) | Lu(1)-O(1) | 2.365(3) |
| Lu(1)-O(3) | 2.255(3) | Lu(1)-O(5) | 2.335(3) | Lu(1)-O(8) | 2.430(4) |
| Lu(1)-O(2) | 2.317(3) | Lu(1)-O(7) | 2.349(3) | | |

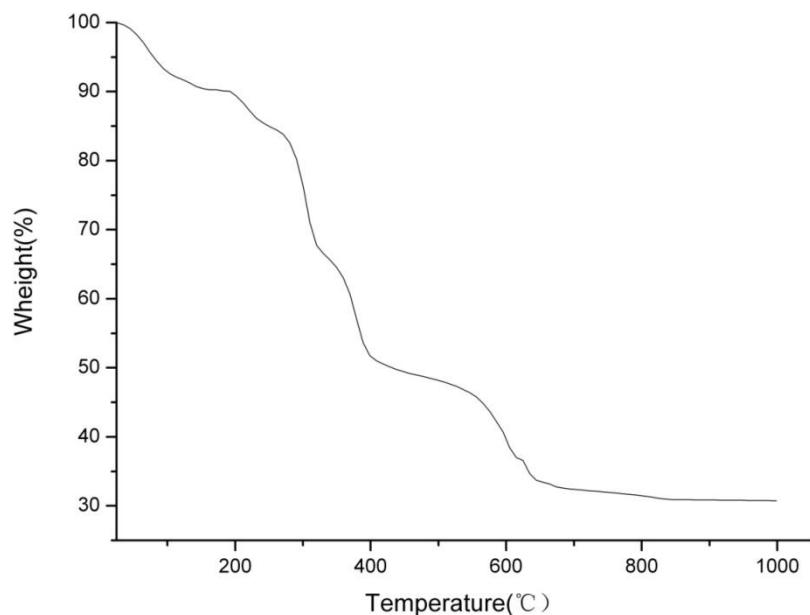


Figure S1. TG curve of **1** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

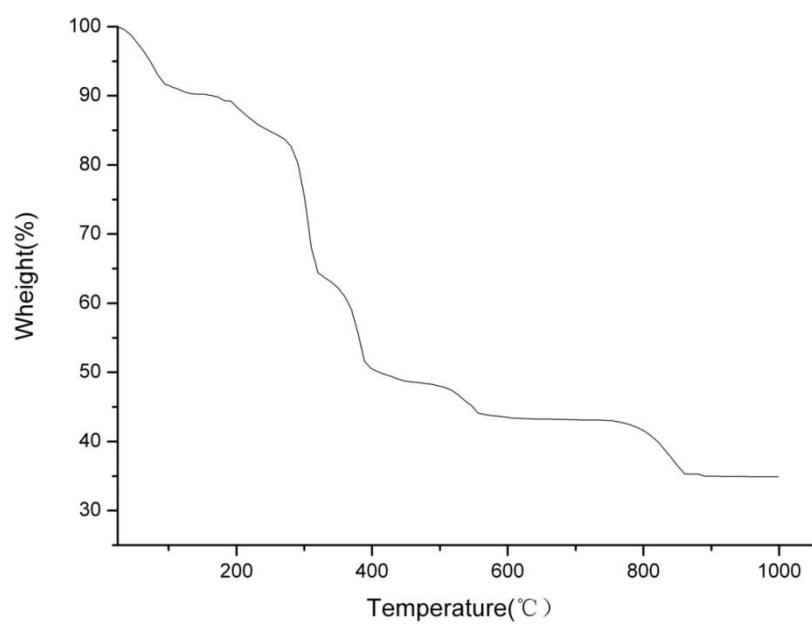


Figure S2. TG curve of **2** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

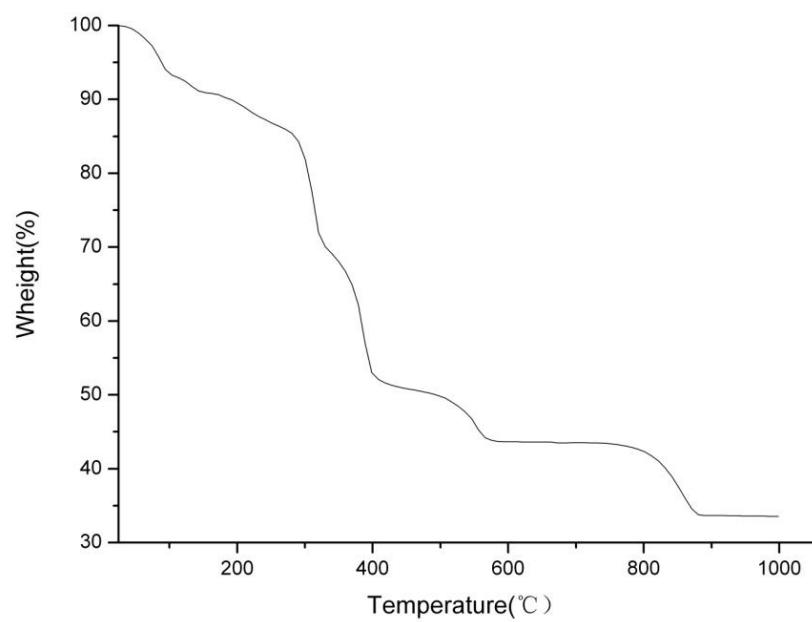


Figure S3. TG curve of **3a** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

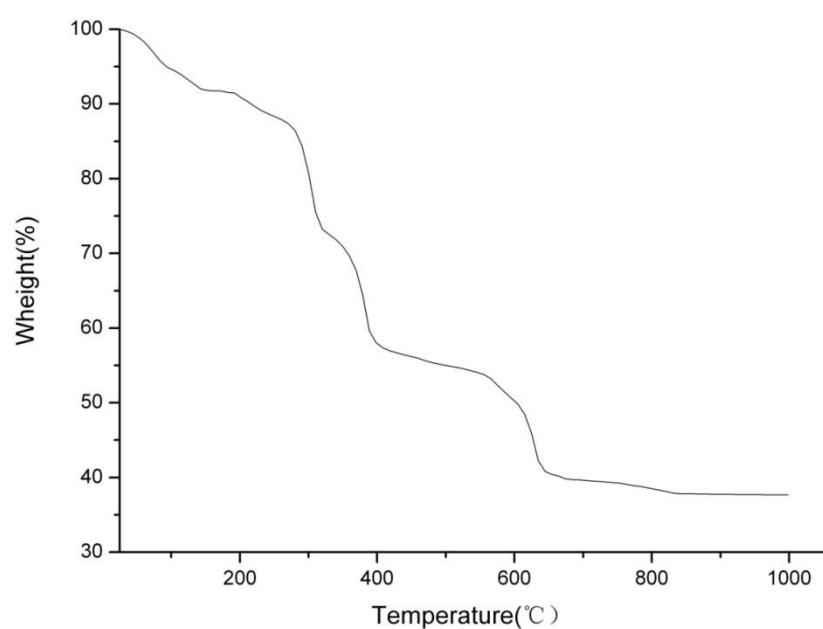


Figure S4. TG curve of **3b** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

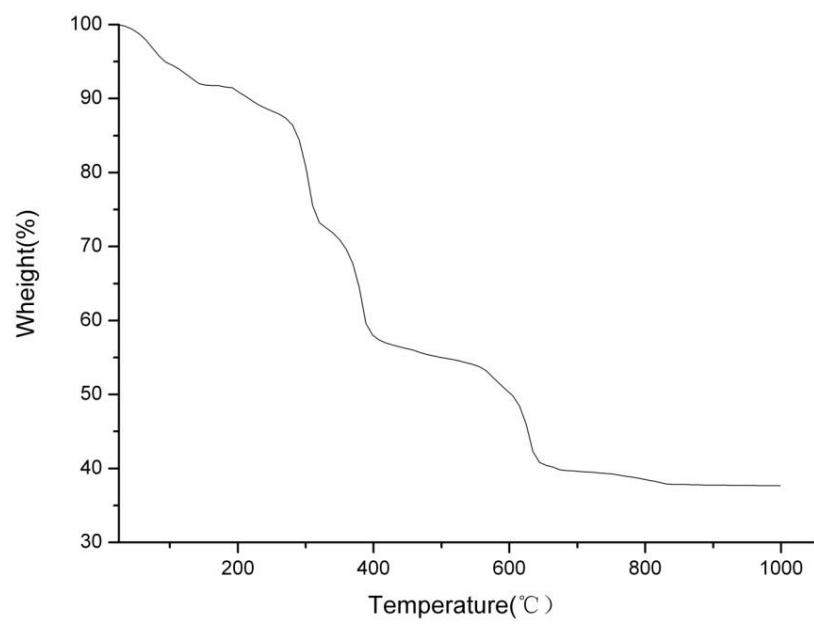


Figure S5. TG curve of **3c** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

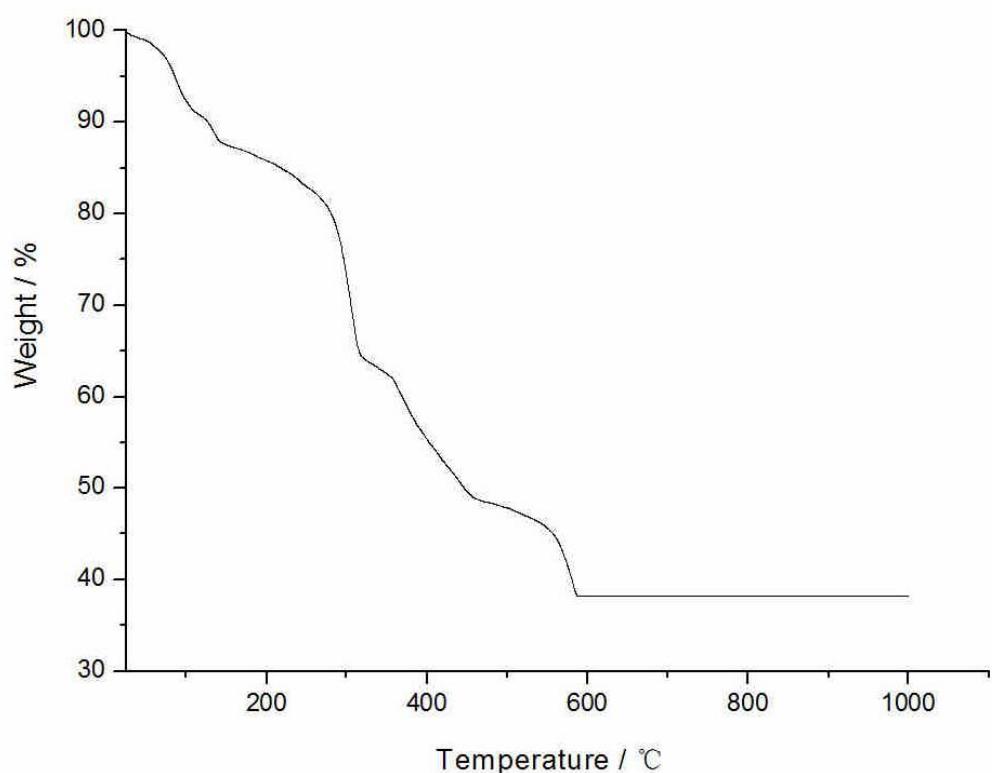


Figure S6. TG curve of **4** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

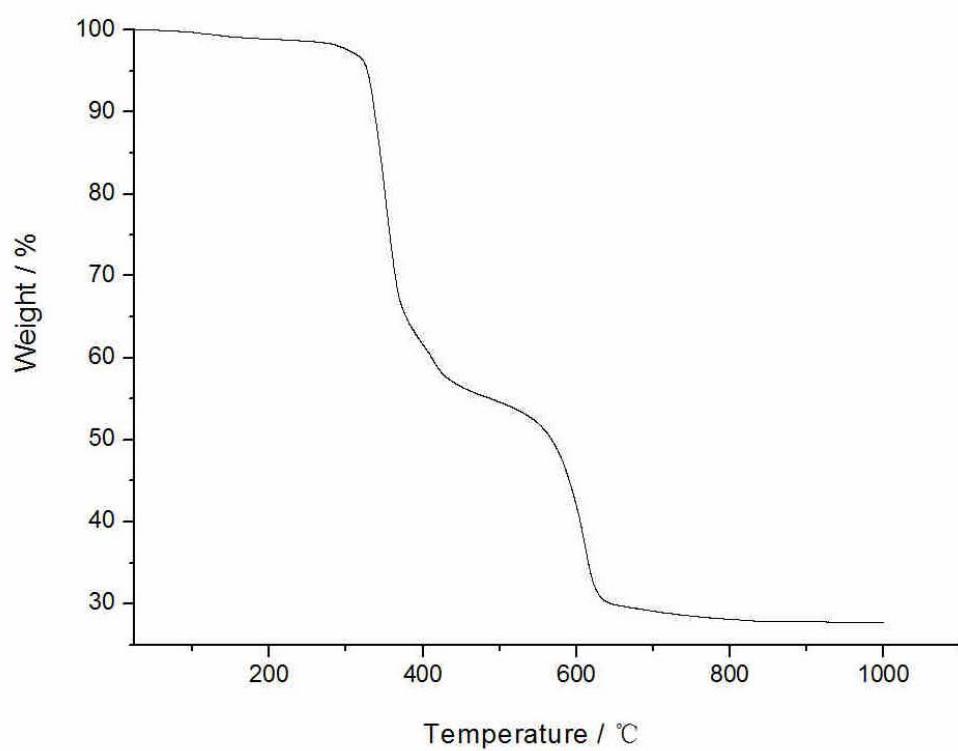


Figure S7. TG curve of **5a** (Temperature variation from 25 °C to 1000 °C at a

heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

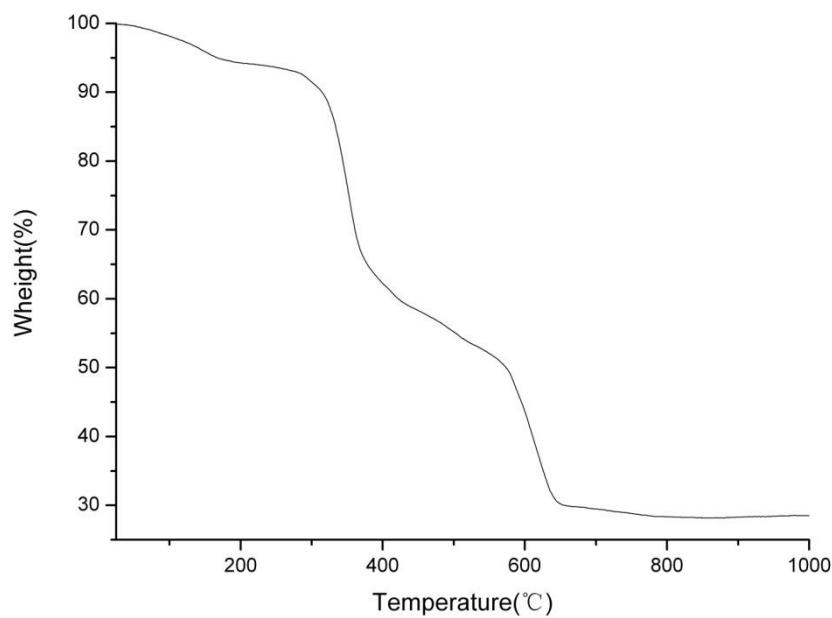


Figure S8. TG curve of **5b** (Temperature variation from $25\text{ }^{\circ}\text{C}$ to $1000\text{ }^{\circ}\text{C}$ at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

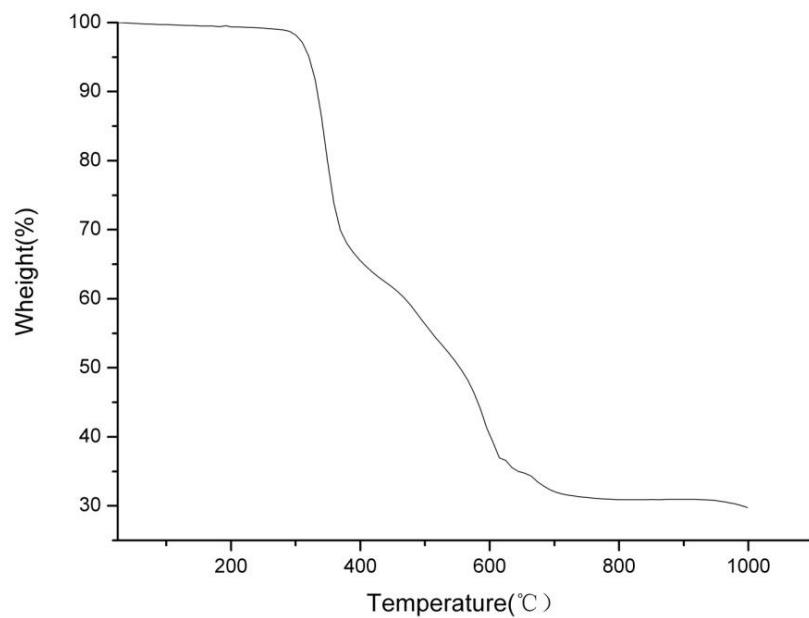


Figure S9. TG curve of **5c** (Temperature variation from $25\text{ }^{\circ}\text{C}$ to $1000\text{ }^{\circ}\text{C}$ at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

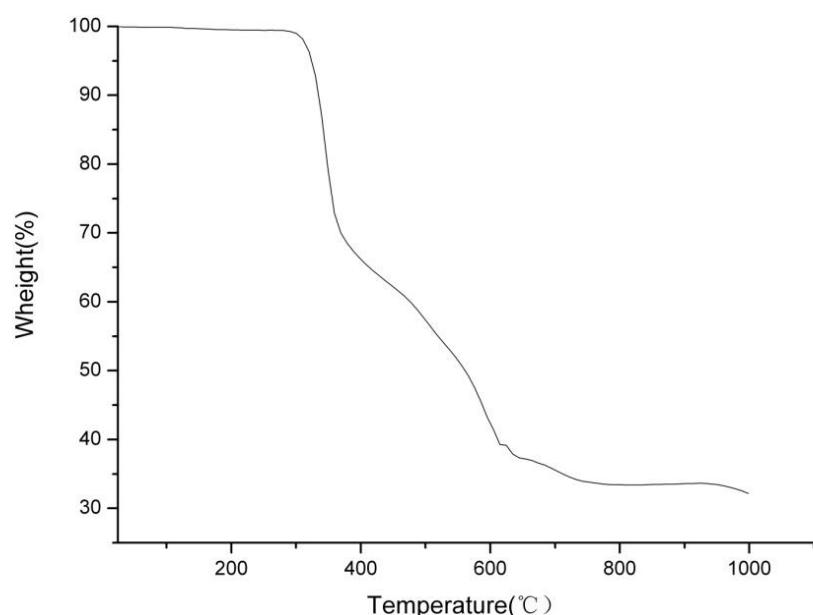


Figure S10. TG curve of **5d** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

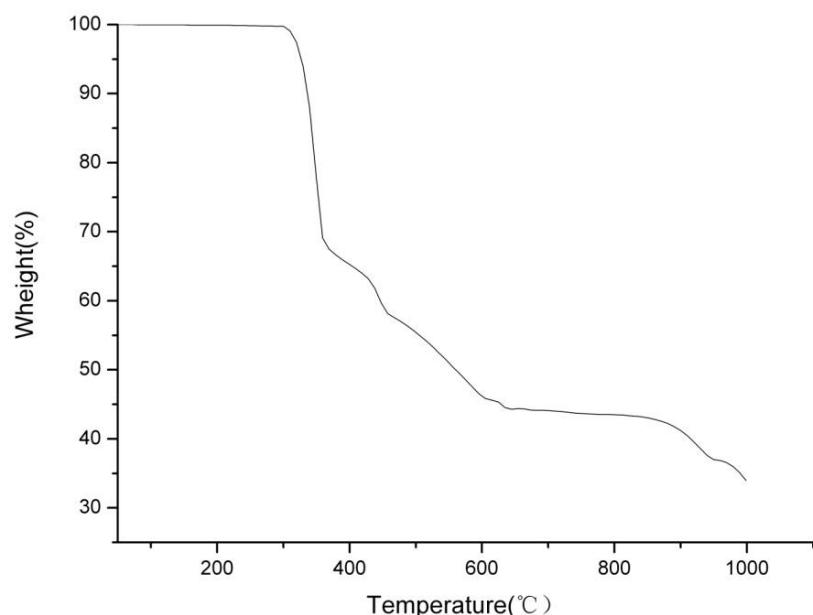


Figure S11. TG curve of **5e** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

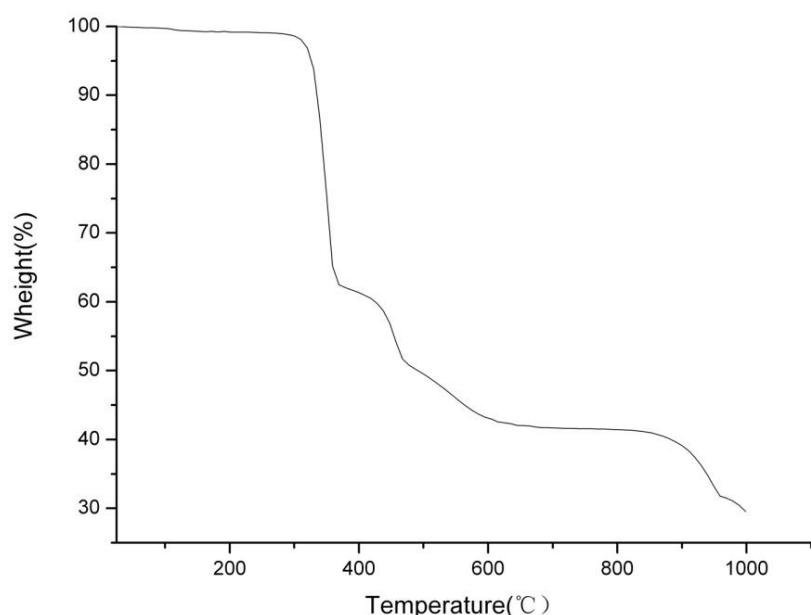


Figure S12. TG curve of **5f** (Temperature variation from 25 °C to 1000 °C at a heating rate of $10\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$ in an N_2 atmosphere).

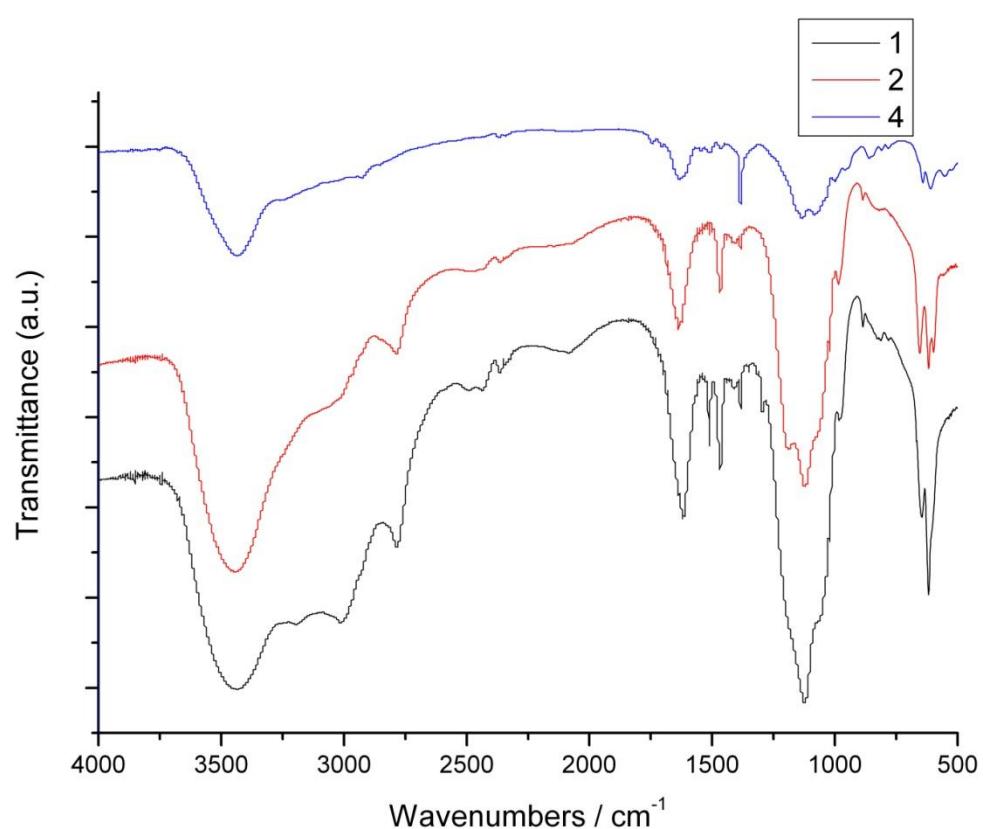


Figure S13. FTIR spectra of the compounds **1**、**2** and **4**.

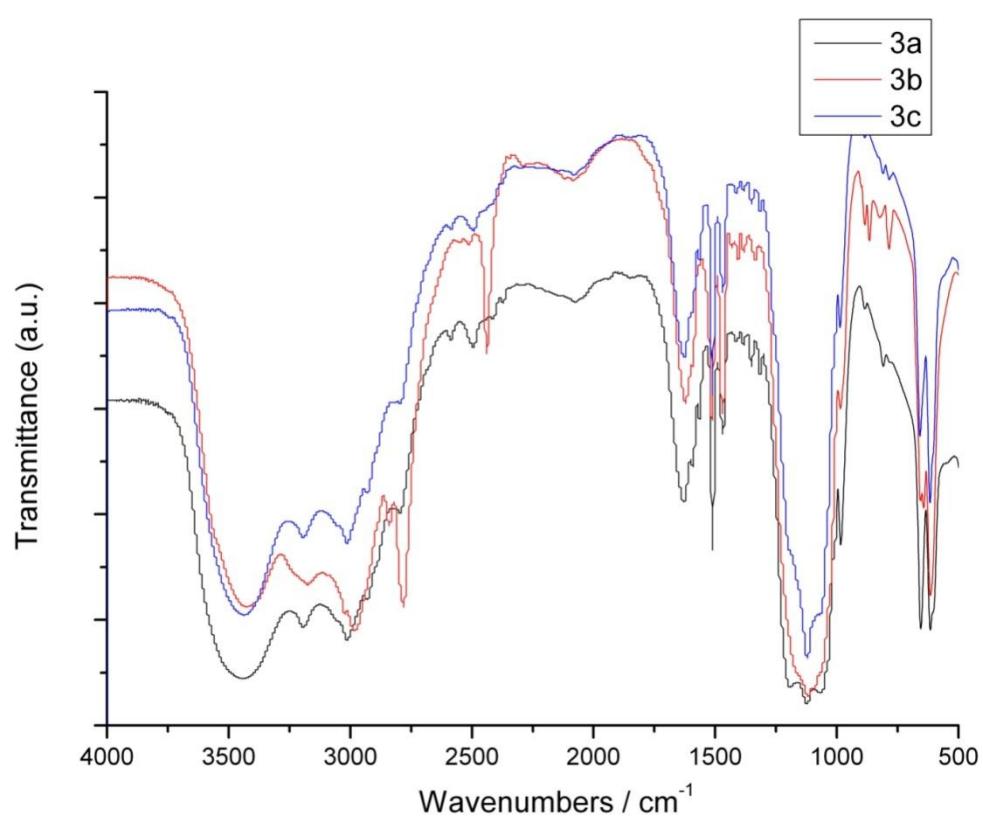


Figure S14. FTIR spectra of the compounds **3a**、**3b** and **3c**.

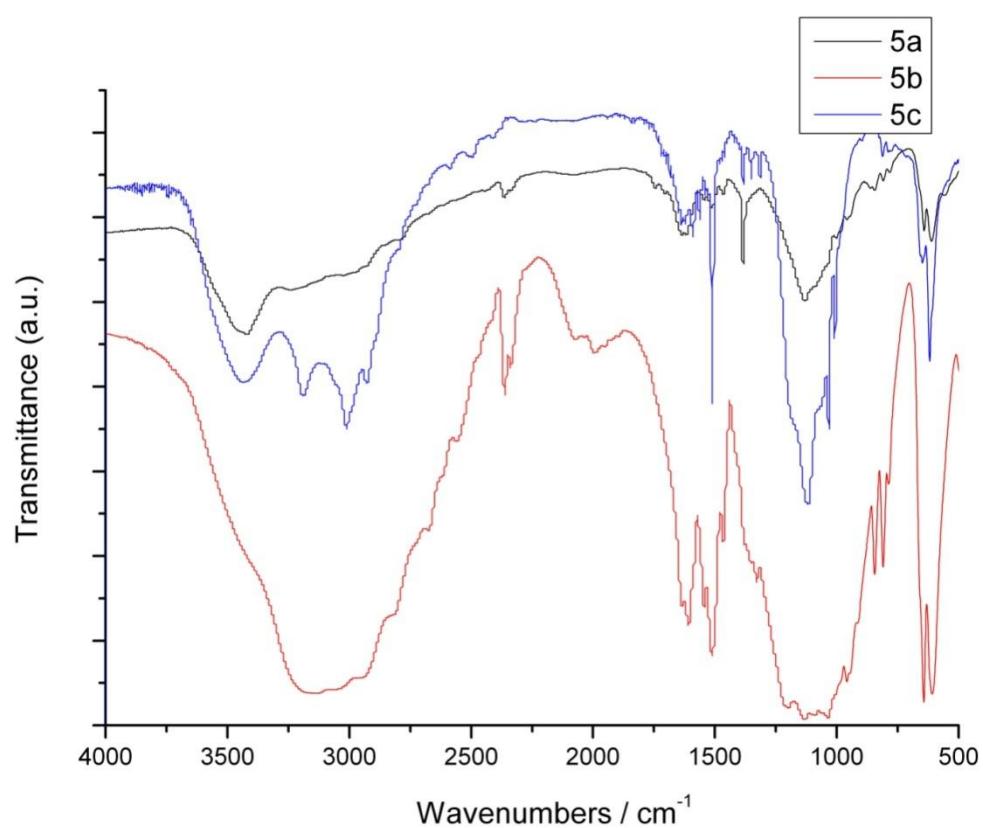


Figure S15. FTIR spectra of the compounds **5a**, **5b** and **5c**.

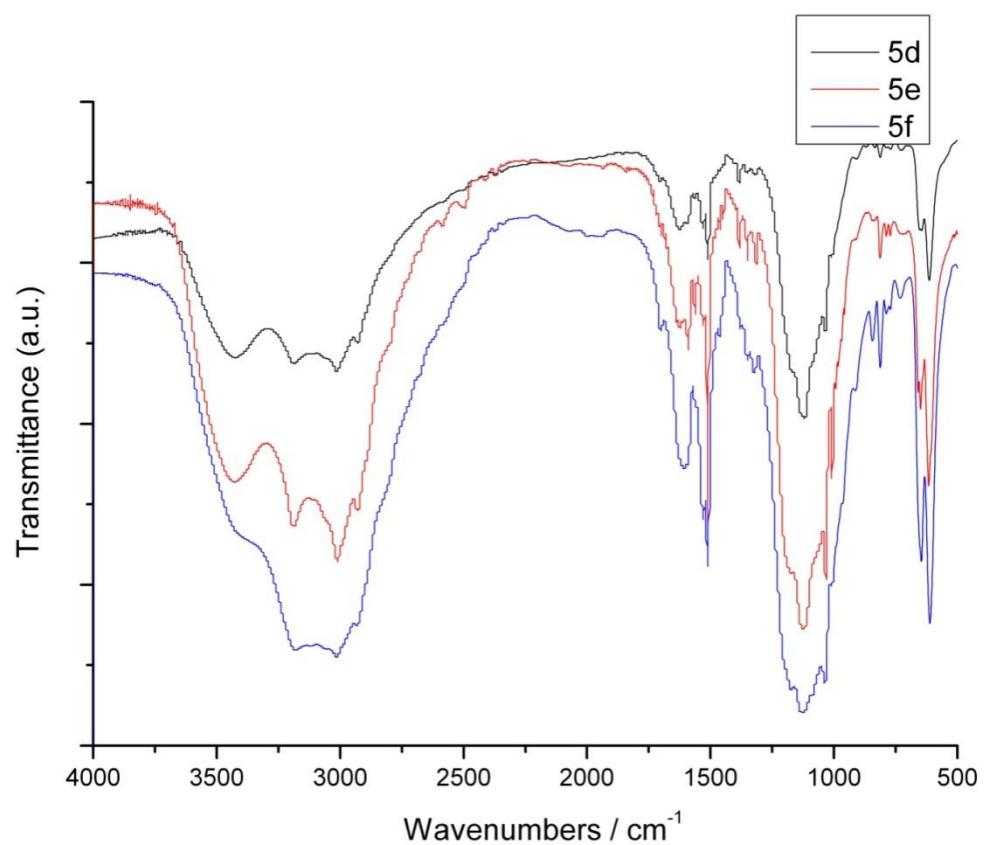


Figure S16. FTIR spectra of the compounds **5d**、**5e** and **5f**.