Supporting information

Unraveling the highly selective nature of silver-based metal-organic complexes for the detection of metal ions: Synergistic effect of dicarboxylic acid linkers

Chi Van Nguyen[a,b], Babasaheb M. Matsagar[c], Tansir Ahamad,[d] Saad M Alshehri,[d] Wei-Hung Chiang[a,]* and Kevin C.-W. Wu[c,]*

[a] Department of Chemical Engineering, National Taiwan University of Science and Technology. No. 43, Sec. 4, Keelung Road, Taipei 10607, Taiwan

[b] Institute of Applied Science and Technology, Van Lang University, Ho Chi Minh 700000, Vietnam

[c] Department of Chemical Engineering, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei 10617, Taiwan

[d] Department of Chemistry, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia.

*Corresponding Author's E-mails: whchiang@mail.ntust.edu.tw (W.-H. Chiang), kevinwu@ntu.edu.tw (Kevin C.-W. Wu)

Experiments

Deermination of detection limit of Ag-PLMOCs to Fe^{3+} and Pb^{2+}

The calculation method was conducted by following the previous procedure.[1]

Initially, the standard deviation (S_b) was calculated following the equation (1)

$$S_b = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} \qquad (1)$$

x_i is the emissive intensity of Ag-PLMOCs in water

$\bar{x}$ is the average emissive intensity of Ag-PLMOCs in water for 11 times.

Then, the solution containing a certain amount of Fe^{3+} or Pb^{2+} and Ag-PLMOCs was measured to record the variation of emission intensity (ΔI). The precison value (S) was calcualted by the equation (2)
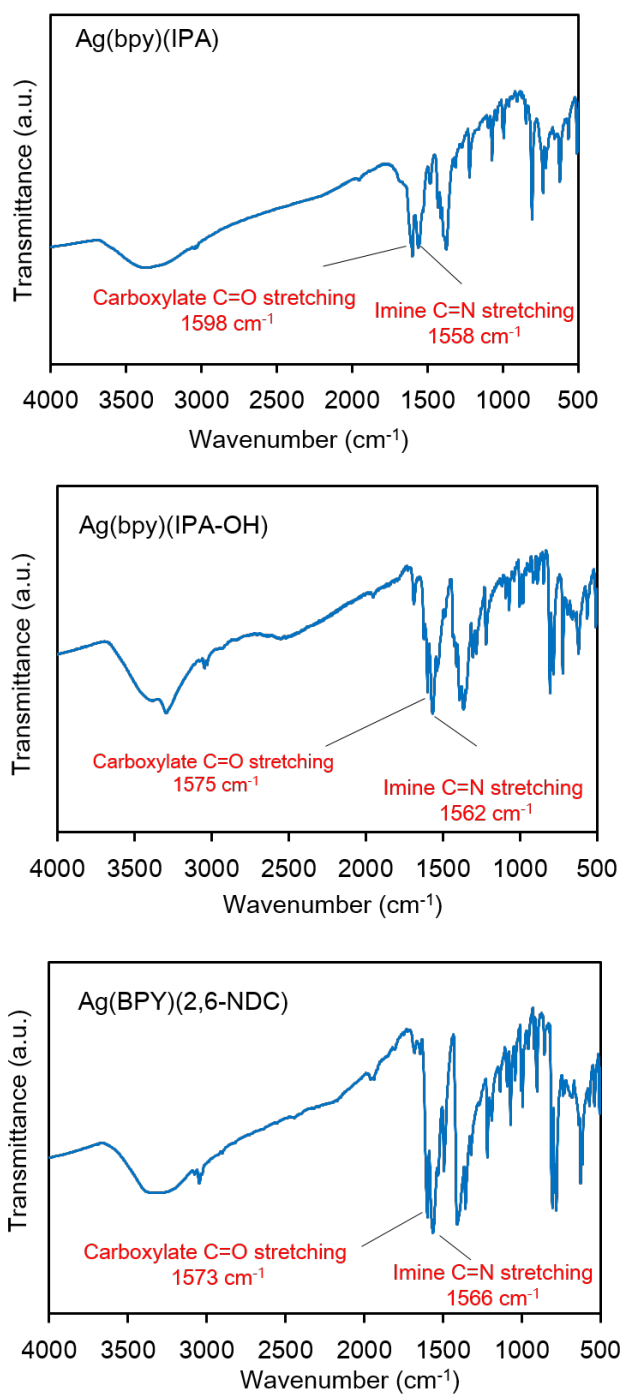
$$S = \frac{\Delta I}{\Delta C} \qquad (2)$$

ΔC is the variation of quencher concentration.

Finally, the limit of detection (LOD) was calculated by equation (3).
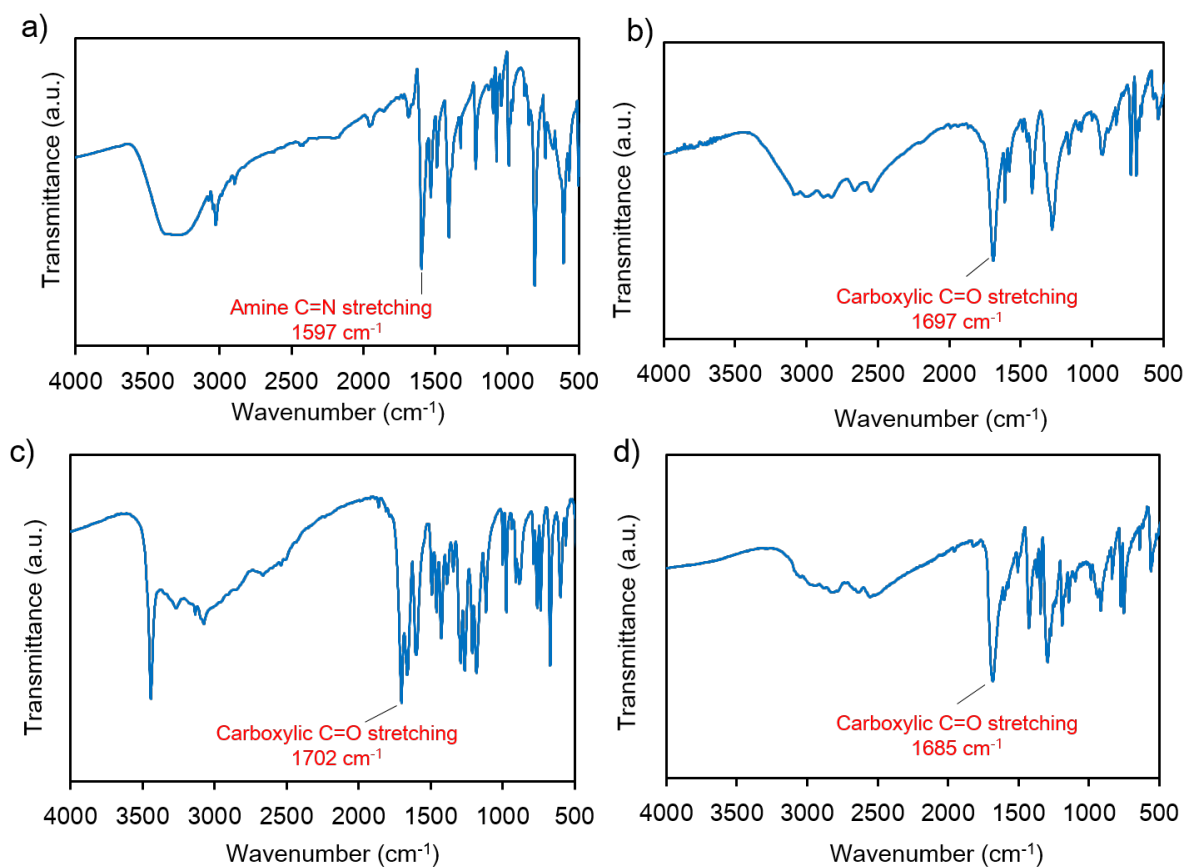
$$LOD = \frac{3S_b}{S} \qquad (3)$$
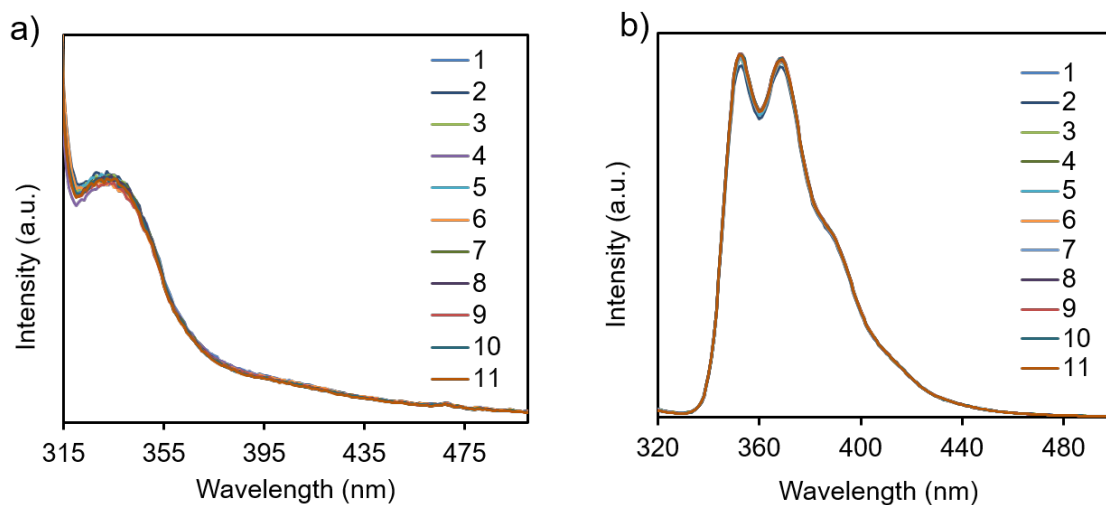
Fig. S1 PL spectra of a) Ag(bpy)(IPA-OH) and b) Ag(bpy)(2,6-NDC) in water with repetition of 11 times.

Fig. S2 FT-IR spectra of as-synthesized Ag-based MOCP demonstrated the presence of imine linkage and carboxylate formation.

Fig. S3 FT-IR spectra of a) 4-4'-bipyridine, b) Isophthalic acid (IPA), c) 5-hydroxyisophthalic acid (IPA-OH), and d) 2,6-napthalenedicarboxylic acid (2,6-NDC) as starting material for comparison.
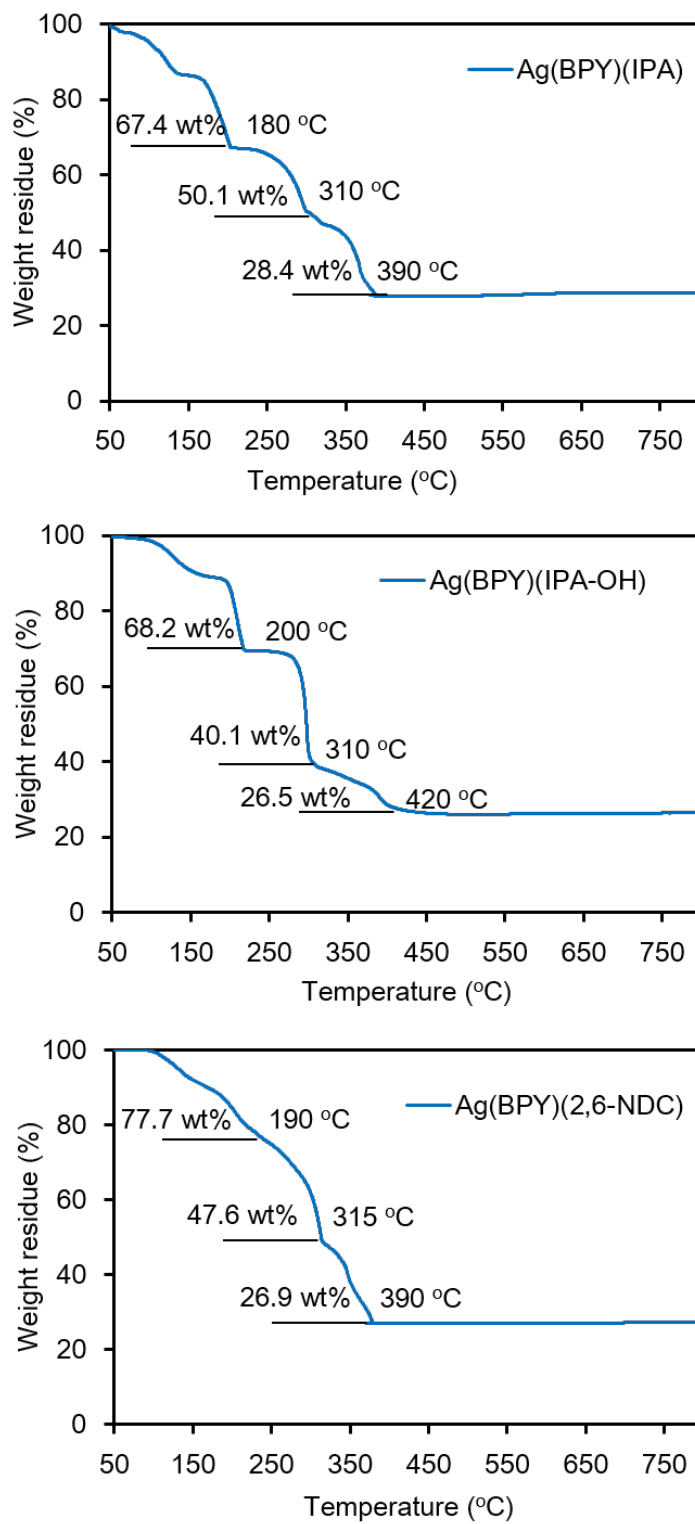
Fig. S4 TGA results of as-synthesized Ag-based MOCPs demonstrated the thermal stability of these materials.
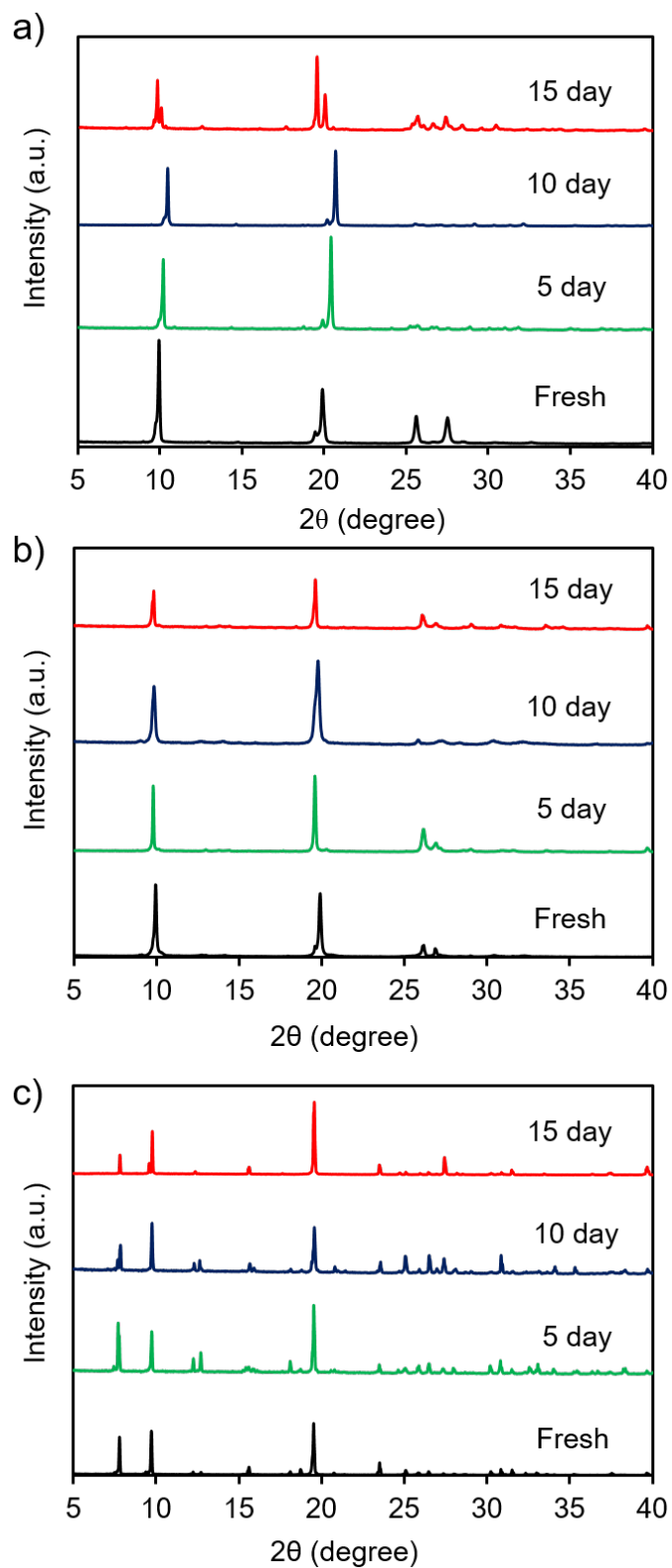
Fig. S5 Stability of Ag-PLMOCs in water at 50 ºC at different times, a) Ag(bpy)(IPA), b) Ag(bpy)(IPA-OH) and c) Ag(bpy)(2,6-NDC).

Table S1 Excitation and emission of bare linkers and synthesized Ag-based MOC
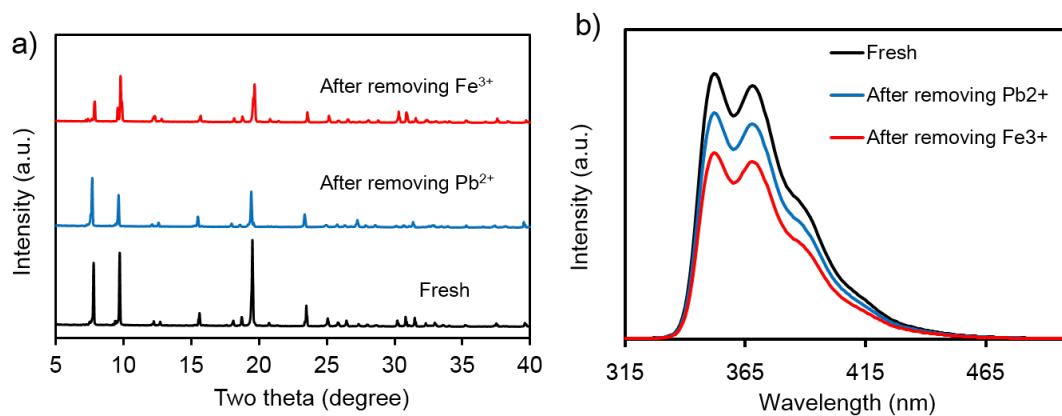
| Materials	Excitation (nm)	Emission (nm)
IPA	N/A	N/A
IPA-OH	337	350
2,6-NDC	383	400
IPA-NH$_2$	380	445
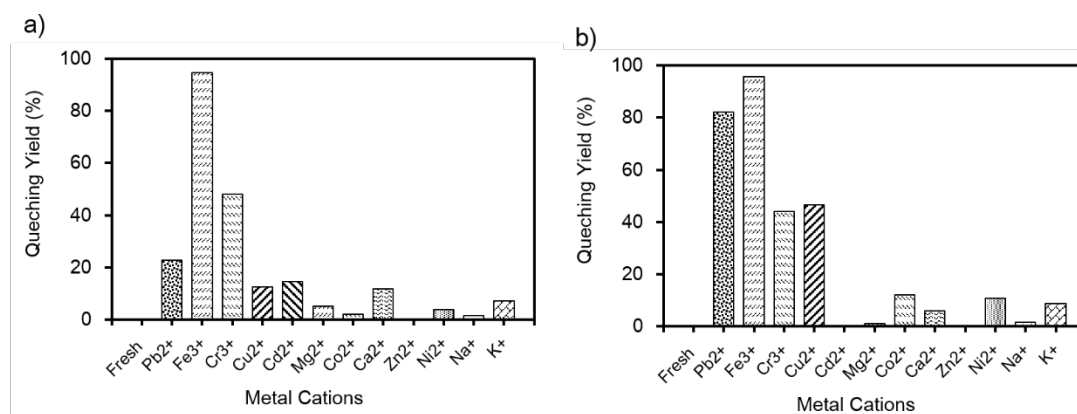
Fig. S6 PL quenching percentage of metal ions on a) Ag(bpy)(IPA-OH) and b) Ag(bpy)(2,6-NDC) as host material.
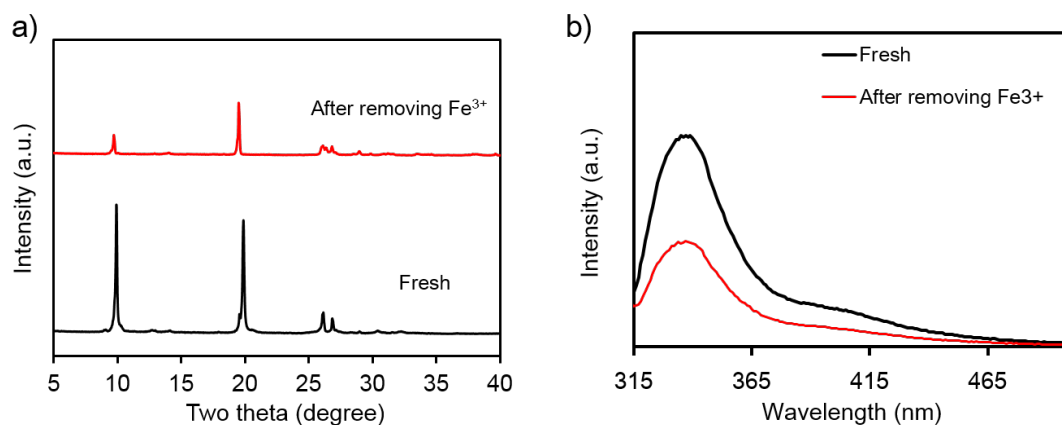
Fig. S7 a) XRD and b) PL spectra of Ag(bpy)(IPA-OH) before and after immersing in Fe^{3+} ion solution.
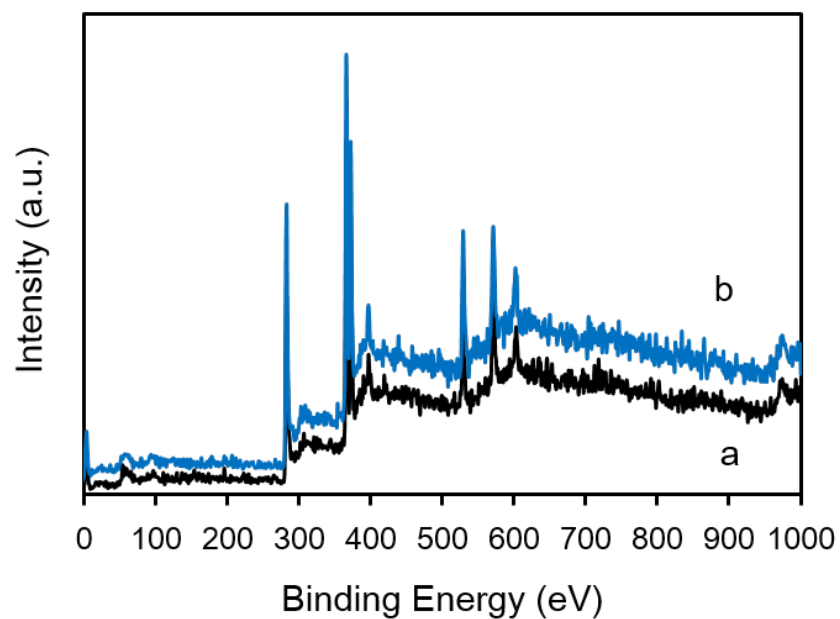
Fig. S8 a) XRD and b) PL spectra of Ag(bpy)(2,6-NDC) before and after immersing in Fe^{3+} or Pb^{2+} ion solution.
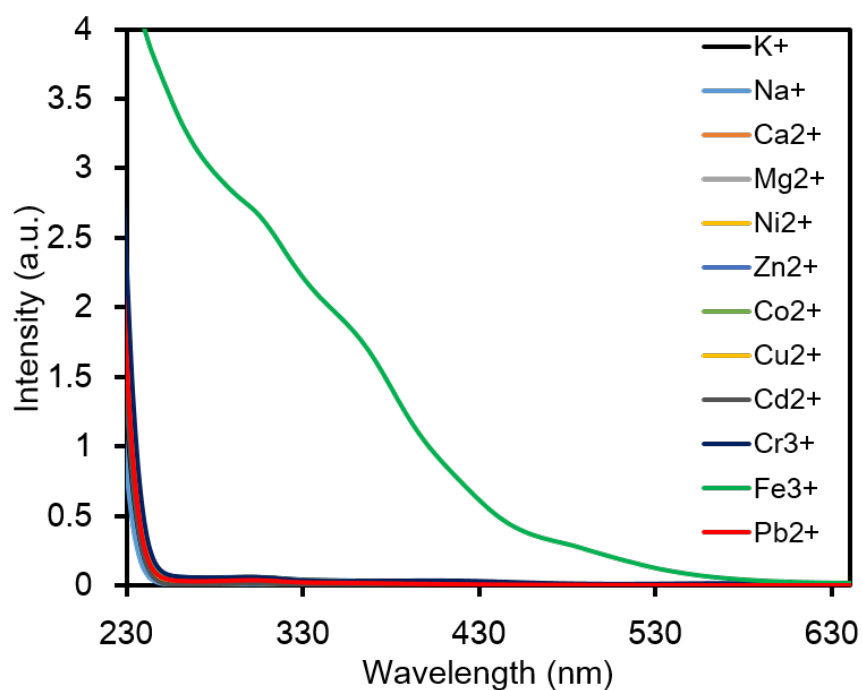
Fig. S9 UV-Vis spectra of various metal ion solutions.

Fig. S10 XPS spectra of a) fresh Ag(bpy)(2,6-NDC) and b) Ag(bpy)(2,6-NDC) after immersing and removal of Pb^{2+}.

References:

1. G. He, H. Peng, T. Liu, M. Yang, Y. Zhang and Y. Fang, *J. Mater. Chem.*, 2009, **19**, 7347-7353.