## **Supplementary Information**

## Electrochemical Eu(III) behaviours and Eu oxysulfate recovery

## over terpyridine-functionalized indium tin oxide electrodes

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**Fig. S1**. Molecular orbitals of HOMO, HOMO-1, HOMO-2, HOMO-3, LUMO, LUMO+1, LUMO+2, and LUMO+3 for Tpy in gaseous and aqueous states.



**Fig. S2**. SEM images of electrodeposited Eu on bare ITO (A) and ITO-Tpy (B) electrodes for 10 min after 550 °C thermal annealing.



**Fig. S3**. EDXS spectra of electrodeposited (10 min) Eu on bare ITO (top) and ITO-Tpy (bottom) electrodes after 550 °C thermal annealing.



**Fig. S4**. XRD patterns of electrodeposited (30 min) Eu(III) on bare ITO (left) and ITO-Tpy (right) electrodes before (bottom) and after 550 °C (top) thermal annealing. The references patterns of  $Eu_2(SO_4)_3$  (blue color) and  $EuSO_4$  (green color) are shown on top. XRD signals (red star symbol) from ITO support is also seen.



Fig. S5. FFT patterns of the HRTEM images shown in Figure 7.



**Fig. S6**. FT-IR spectra of electrodeposited (10 min) Eu on bare ITO (top) and ITO-Tpy (bottom) electrodes before and after thermal annealing.



**Fig. S7**. XPS spectra of electrodeposited (10 min and 30 sec) Eu(III) on bare ITO and ITO-Tpy electrodes before and after 550 °C-thermal annealing.



**Fig. S8**. Emission spectra for the electrodeposited Eu(III) on bare ITO and ITO-Tpy electrodes for 30 sec before and after thermal treatment (550 °C), and their corresponding 2 and 3D-PL contour mapping spectra for the thermal treated samples.



**Fig. S9**. Change in emission signal intensity upon adsorption of DMMP, DMP, DEMP, and DEP molecules.