Supplementary data

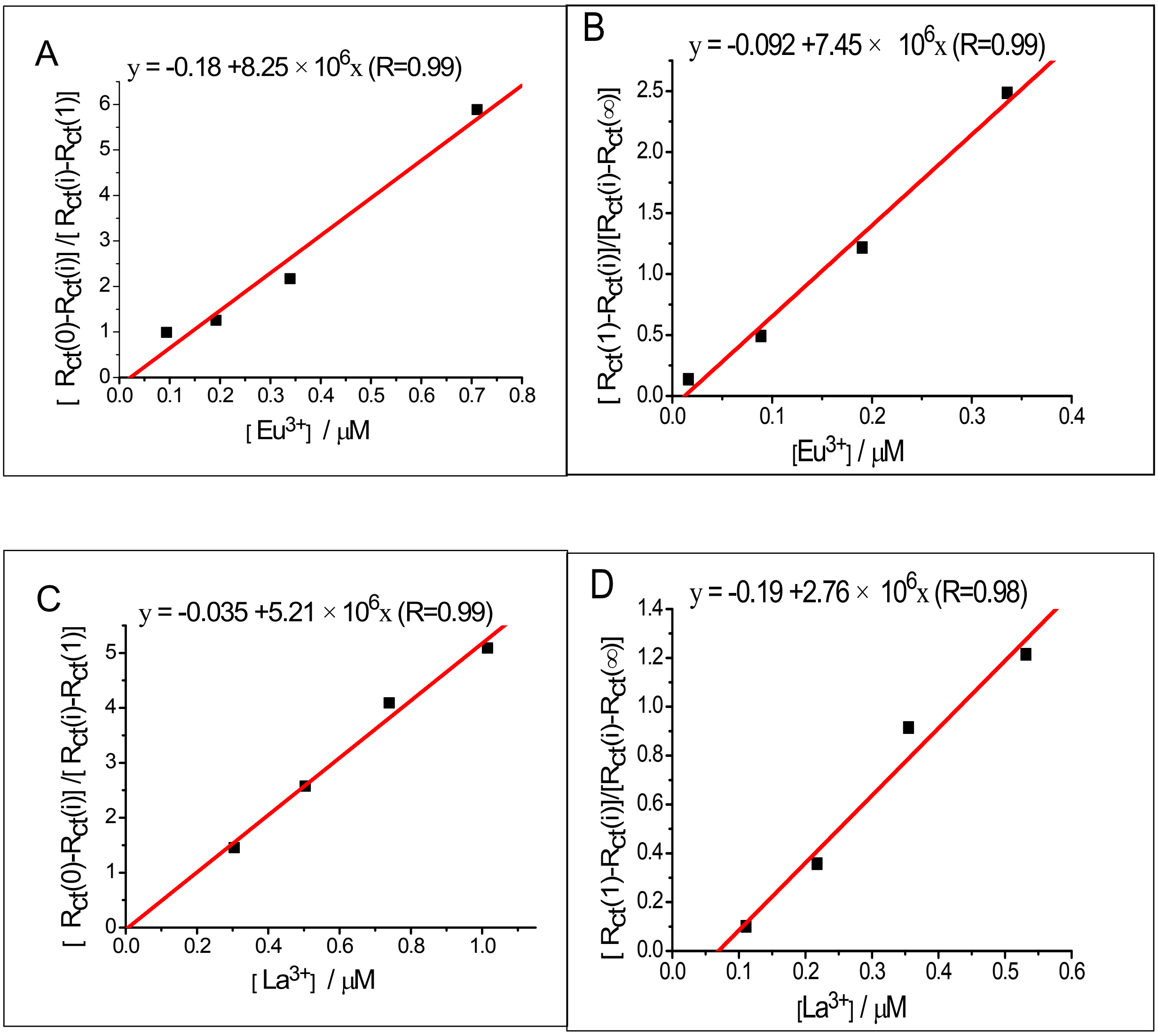

Fig.S1 The linear relationship of $[R_{ct}(0)-R_{ct}(i)]/[R_{ct}(i)-R_{ct}(1)]$ vs. $[Eu^{3+}]$**(A)** and $[La^{3+}]$**(C).** The linear relationship of $[R_{ct}(1)-R_{ct}(i)]/[R_{ct}(i)-R_{ct}(\infty)]$ vs. $[Eu^{3+}]$ **(B)** and $[La^{3+}]$**(D).**

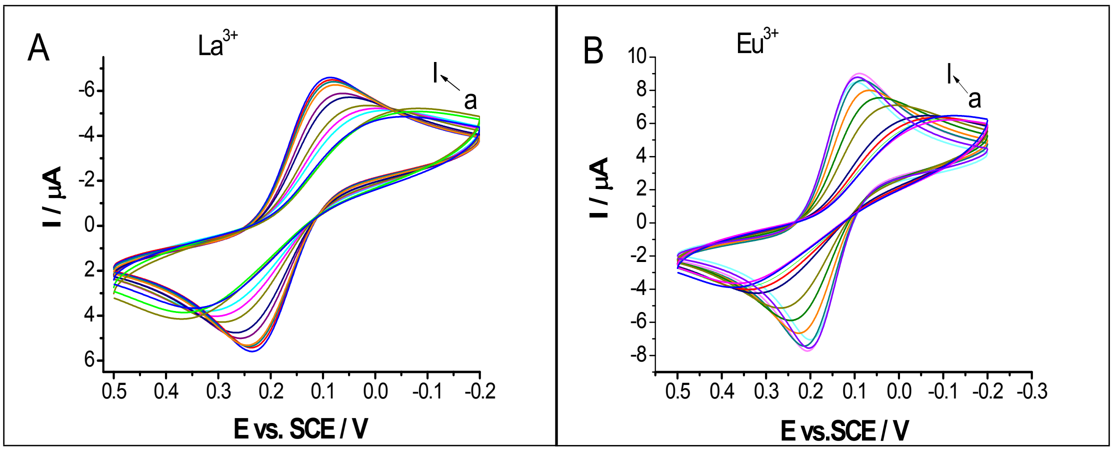

Fig. S2 Cyclic voltammograms of 1.0 mM $Fe(CN)_6^{3-}$ at a N-EoCen coated GC electrode in 0.01 M Hepes, 0.02 M KCl solutions (pH 7.4) containing different concentration of La^{3+}(**A**) (from a to l): 0, 1.75, 2.90, 4.58, 5.14, 5.69, 6.24, 6.78, 7.59, 8.38, 9.17, 9.96μM, and Eu^{3+}(**B**) (from a to l): 0, 1.53, 2.14, 3.04, 4.22, 4.81, 5.40, 5.97, 6.55, 7.40, 8.25, 9.91μM.

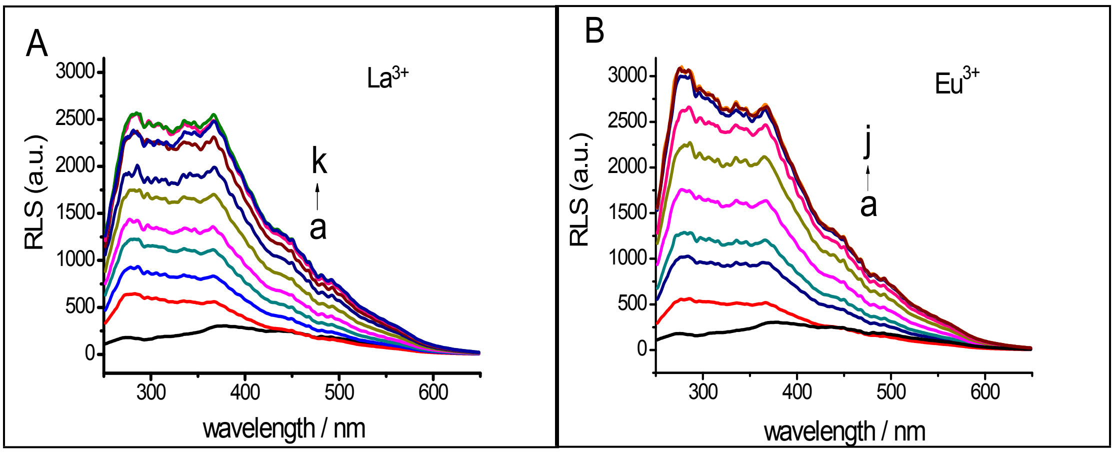

Fig. S3: **A**: Resonance light scattering spectra for the addition of La^{3+} to the solution of N-EoCen in 10 mM Hepes at pH 7.4, 0.02 M KCl at [La^{3+}]/[N-EoCen]=0(a); 0.32(b); 0.63(c); 0.95(d); 1.26(e); 1.58(f); 1.89 (g); 2.05 (h); 2.37 (i); 2.68 (j); 2.88 (k). **B**: Resonance light scattering spectra for the addition of Eu^{3+} to the solution of N-EoCen in 10 mM Hepes at pH 7.4, 0.02 M KCl at [Eu^{3+}]/[N-EoCen]=0(a); 0.22(b); 0.66(c); 0.88(d); 1.32(e); 1.77(f); 1.98 (g); 2.43 (h); 2.87 (i); 3.09 (j).

Calculation of average binding constant of Ca^{2+} to N-EoCen

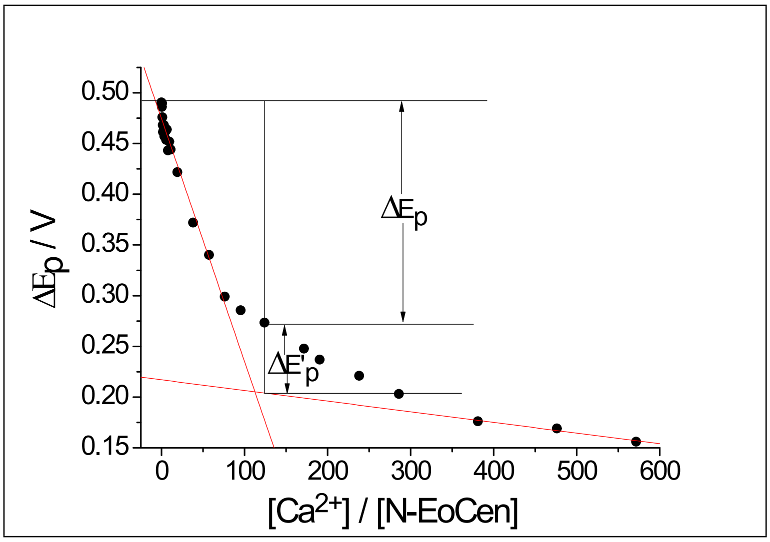

Fig. S4 The peak separations (ΔE_p) of the redox reaction as a function of $[Ca^{2+}]$/[N-EoCen].

Due to the weak binding ability of Ca^{2+} to N-EoCen, the equilibrium concentration of Ca^{2+} ($[Ca^{2+}]$) can be approximate to the total concentrations of Ca^{2+} ($[Ca^{2+}]_t$). So, the average binding constant of Ca^{2+} to N-EoCen can be obtained approximately by the following equation:

$$K = \frac{[Ca^{2+}\text{-N-EoCen}]}{[Ca^{2+}][\text{N-EoCen}]} \approx \frac{\Delta E_p}{[Ca^{2+}]_t \bullet \Delta E_p^{'}}$$