Supporting Information

Colorimetric and luminescent bifunctional Ru(II) complexes for rapid and highly sensitive recognition of cyanide

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Fig. S1 UV-Vis spectra of other three Ru(II) complexes (20 μM) after addition of CN⁻ in CH₃CN/H₂O (99.6:0.4 v/v) solution containing 50 mM Bu₄NPF₆ at 25 °C.

Fig. S2 (Left) PL titration of other three Ru(II) complexes (5 μM) with CN⁻ in CH₃CN/H₂O (99.6:0.4 v/v) solution containing 50 mM Bu₄NPF₆ at 25 °C. (Right) Plot of the PL intensity change (I − I₀) at about λ₆₁₈ nm upon addition of CN⁻ (lines serve to illustrate the change in stoichiometry).

Fig. S3 PL spectra of other three Ru(II) complexes (5 μM) with different anions in CH₃CN/H₂O (99.6:0.4 v/v) solution containing 50 mM Bu₄NPF₆ at 25 °C.

Fig. S4 Behavior of other three Ru(II) complexes toward CN⁻ and other anions as measured by PL in CH₃CN/H₂O (99.6:0.4 v/v) solution containing 50 mM Bu₄NPF₆ at 25 °C.

Fig. S5 Time course of the photoluminescence response of other three Ru(II) complexes (5 μM) upon addition of CN⁻ in CH₃CN/H₂O (99.6:0.4 v/v) solution containing 50 mM Bu₄NPF₆ at 25 °C.

Fig. S6 ESI-MS experiments of the 1:1 {[Ru(bpy)₂(L₁-CN)]²⁺CN⁻}⁺, 1:1 {[Ru(dmb)₂(L₂-CN)]²⁺CN⁻}⁺, and the 1:2 adduct, {[Ru(dmb)₂(L₂-2CN)]²⁺PF₆⁻}⁺

Fig. S7 ¹H NMR spectroscopy of [Ru(bpy)₂(L₁)](PF₆)₂ and CN⁻ in CD₃CN
Fig. S1

[Figures showing absorbance spectra for different wavelengths and concentrations of CN⁻ for [Ru(dmb)₂L₁](PF₆)₂, [Ru(bpy)₂L₁](PF₆)₂, and [Ru(bpy)₂L₂](PF₆)₂]
Fig. S2

[Ru(dmb)2L1](PF6)2

[Ru(bpy)2L1](PF6)2

[Ru(bpy)2L2](PF6)2
Fig. S3

**[Ru(dmb)₂L₁](PF₆)₂**

**[Ru(bpy)₂L₁](PF₆)₂**

**[Ru(bpy)₂L₂](PF₆)₂**
Fig. S4

[Ru(dmb)₂L₁](PF₆)₂

[Ru(bpy)₂L₁](PF₆)₂

[Ru(bpy)₂L₂](PF₆)₂
Fig. S5

- at 619 nm in 0.4% aqueous acetonitrile

\[ \text{[Ru(dmb)2L1](PF6)2} \]

- at 618 nm in 0.4% aqueous acetonitrile

\[ \text{[Ru(bpy)2L1](PF6)2} \]

- at 616 nm in 0.4% aqueous acetonitrile

\[ \text{[Ru(bpy)2L2](PF6)2} \]
Fig. S6

\[ \text{[Ru(bpy)$_2$(L1-CN)]}^{2+} \text{CN}^- \ (m/z, 664.3) \]

\[ \text{[Ru(dmb)$_2$(L2-CN)]}^{2+} \text{PF}_6^- \ (m/z, 880.7) \]
Fig. S7

\[ \text{[Ru(bpy)\textsubscript{2}(L1)](PF\textsubscript{6})\textsubscript{2}} \]

\[ \text{[Ru(bpy)\textsubscript{2}(L1)](PF\textsubscript{6})\textsubscript{2} + CN^{-}} \]
$[\text{Ru(bpy)}_2(L_2)](\text{PF}_6)_2 + \text{CN}^-$

$[\text{Ru(bpy)}_2(L_2)]^{2+}$