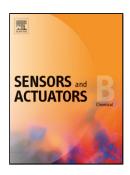
Accepted Manuscript

Accepted date:

Title: pH and copper ion luminescence on/off sensing by a dipyrazinylpyridine-appended ruthenium complex

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24-6-2015



 PII:
 S0925-4005(15)30027-7

 DOI:
 http://dx.doi.org/doi:10.1016/j.snb.2015.06.124

 Reference:
 SNB 18701

 To appear in:
 Sensors and Actuators B

 Received date:
 18-1-2015

 Revised date:
 24-6-2015

Please cite this article as: Z.-B. Zheng, S.-Y. Kang, N. Zhang, X. Yi, K.-Z. Wang, pH and copper ion luminescence on/off sensing by a dipyrazinylpyridine-appended ruthenium complex, *Sensors and Actuators B: Chemical* (2015), http://dx.doi.org/10.1016/j.snb.2015.06.124

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pH and copper ion luminescence on/off sensing by a dipyrazinylpyridine-appended ruthenium complex

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Abstract

A new ruthenium(II) complex of $[Ru(bpy)_2(HL^1)](ClO_4)_2 \cdot 4H_2O(1 \cdot 4H_2O)$ {bpy = 2,2'-bipyridine and HL¹ = 2-(4-(2,6-di(pyrazin-2-yl)pyridin-4-yl)phenyl)-1*H*-imidazo[4,5-*f*][1,10]phenanthroline} was synthesized and characterized by elementary analysis, proton nuclear magnetic resonance spectroscopy and mass spectrometry. The ground- and excited-state acid-base properties of **1** were studied by means of UV-vis absorption spectrophotometric and spectrofluorimetric titrations in 100:1 (v/v) Britton-Robinson buffer/CH₃CN solution in combination with luminescence lifetime measurements. The complex exhibited two-step separate protonation/deprotonation processes in both the ground and excited states, acting as pH-induced "off-on-off" luminescence switches (I_{on}/I_{off} = 100.0 and 3.96). Importantly, **1** also acted as a highly selective luminescent chemosensor toward Cu²⁺ over other metal cations tested (Na⁺, Mg²⁺, Mn²⁺, Fe³⁺, Co²⁺, Ni²⁺, Cu²⁺, Zn²⁺, Cd²⁺, Hg²⁺ and Ag⁺).

Keywords: Ruthenium(II) complex, dipyrazinylpyridine, pH, copper, luminescent chemosensor

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