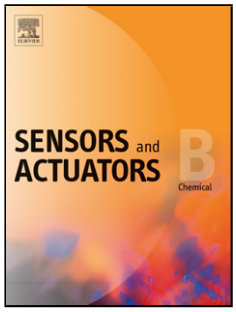

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Inhibiting Proton Interference in PET Chemosensors by Tuning the HOMO Energy of Fluorophores

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Highlights

- A new method for PET chemosensor is proposed to overcome the proton interference.
- The Δ*G* of the electron transfer process can be tuned by different substituents.
- This method reveals a criterion for PET chemosensors design.

Abstract

Fluorescent chemosensors are widely used in chemical engineering, bio-engineering, medical engineering, and environmental engineering. A lot of the chemosensors are based on photo-induced electron transfer (PET) process. In complicated practical systems, the proton is always the most serious interference factor. Herein a new method is proposed for PET chemosensor design to overcome the proton interference: to tune the Δ*G* of the electron transfer process by introducing different substituents of the sensor molecules. Chemosensors for Zn^{2+} detection are demonstrated. When the highest occupied molecular orbital (HOMO) energy levels of the fluorophores (4-substituted 1, 8-naphthalimide) are lower than the HOMO energy level of protonated receptor (dipicolylamine-H^+), the fluorescence responding to Zn^{2+} ions is not influenced by pH, meanwhile, the chemosensors can work in acidic media with pH below the p*K*a values. This should reveal a new criterion for designing of PET based chemosensors for selectivity improvement.