

## On-line Ammonia Sensor and Invisible Security Ink by Fluorescent Zwitterionic Spirocyclic Meisenheimer Complex

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Ammonia is not only a highly important gas for civilization but also contribute significantly for climate change and human health hazard.<sup>1-2</sup> Highly sensitive ammonia sensor has been developed from a fluorescent zwitterionic spirocyclic Meisenheimer complex. Moreover, formation of this Meisenheimer complex can also be utilized for selective as well as naked eye instant detection of nitro aromatic explosive picric acid. The presence of a quaternary nitrogen atom directly attached to the spiro carbon is the unique feature of this Meisenheimer complex. This excellent photoluminescent (PL) Meisenheimer complex has two distinct stimuli responsive sites. One is sensitive towards acid while the other one is towards the base. These two positions can be modulated by adding one equivalent acid and one equivalent base to result two new products which are non fluorescent. One of these two non fluorescent species was found very exciting because of its UV/Vis transparency. Utilizing this concept we have fabricated an on-line sensor for measuring ammonia in dry or humid and condensing sewer air.<sup>3</sup> The sensor was robust against ambient temperature and humidity variation. We have also developed an invisible ink from this Meisenheimer complex, with potential application for security purpose.

### References and Notes:

1. Simpson, D. et al. *Atmos. Chem. Phys.* **2014**, *14*, 6995-7017.
2. White, E. S. J. *Occup. Env. Med.* **1971**, *13*, 549-550.
3. Das, T.; Pramanik, A.; Haldar, D. *Sci. Rep.* **2017**, *7*, 40465.