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Fluorescent and colorimetric sensor for the detection of moisture and their potential applications

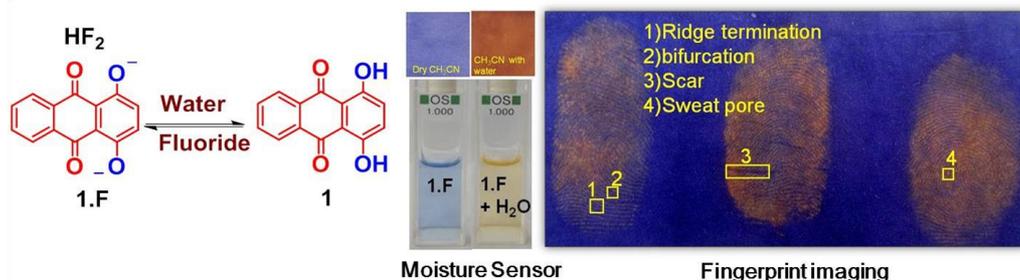
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Moisture is an important impurity in organic solvents, pharmaceutical products, foodstuffs and petroleum-based fuels. Therefore, detection of moisture is one of the most important analytical measurements. Compared to electronic devices, chemical sensors have many advantages such as high selectivity, low detection limit and colorimetric detection, which is easily detectable with the *naked eye* and suitable for applications in daily life.

This presentation aims to describe the use of *off-the-shelf* commercial for the detection of trace amounts of water in the organic solvents. Deprotonation by fluoride ion and re-protonation by moisture (water) is the main working principle behind the colorimetric detection. Deprotonated forms of these dyes have high sensitivity for moisture that can be measured by UV-vis studies and color change. Test papers incorporated with the sensor are fast, reversible and reusable. This portable test strip could measure moisture without the help of any instrument by the simple color change. These probes have many advantages such as low cost, no chemical synthesis, easy availability, naked eye detection and fast response time. Importantly, the ink-less writing in the paper with *write* and *erase* properties are the significant applications.¹



We have also established the use of newly synthesized dansyl based copper complex for the detection of water in various organic solvents such as CH₃OH, THF, CH₃CN and acetone by means of fluorescence emission intensity. This OFF-ON moisture sensor is rapid and convenient fluorescent method to analyze the anhydrous organic solvents before using them in water-sensitive reactions/reagents. This will be advantageous in improving the reaction yields and avoid the side products. Moisture content in commercial food products such as salt, sugar and wheat flour also determined based on OFF-ON emission intensities.²

References

1. Kumar, P. Sakla, R. Ghosh, A. Amilan Jose, D. Reversible Colorimetric Sensor for Moisture Detection in Organic Solvents and Application in Inkless Writing, *ACS Appl. Mater. Interfaces*, **9** (2017) 25600–25605.
2. Kumar, P. Kaushik, R. Ghosh, A. Amilan Jose, D. Detection of Moisture by Fluorescent OFF-ON Sensor in Organic Solvents and Raw Food Products, *Analytical chemistry*, **88** (2016) 11314–11318.