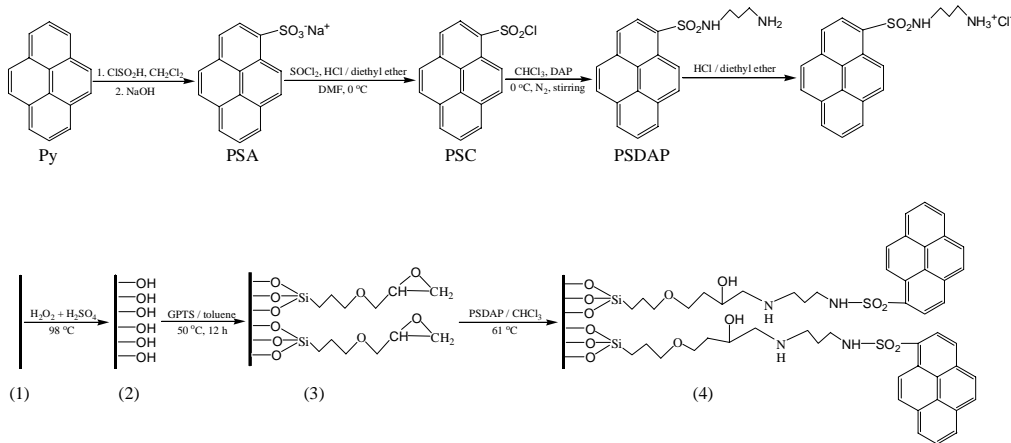


## Supporting Information

### Spacer Layer Screening Effect: A Novel Fluorescent Film Sensor for Organic Copper (II) Salts

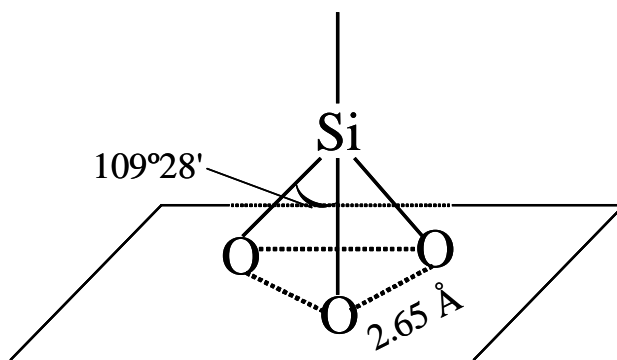
Fengting Lü, Lining Gao, Liping Ding, Linling Jiang and Yu Fang\*



**Figure S1.** The preparation and chemical structure of the film sensor

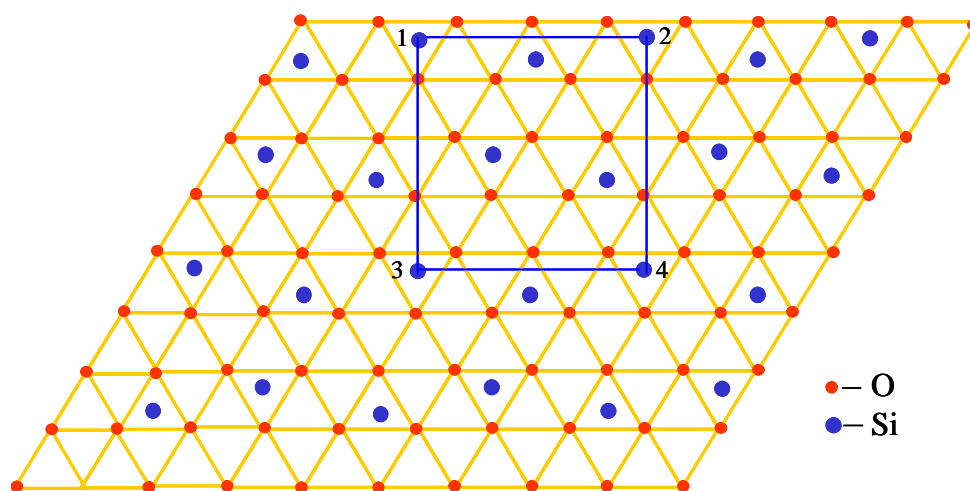
#### Calculation of the loading density of pyrene groups on a self-assembly monolayer of a silanizing agent

Firstly it is supposed that the residue of 3-glycidyloxypropyltrimethoxysilane (GPTS) adopts a structure like that shown in Figure S2, and that the angle of O-Si-O is nearly 109°28'. Since the length of Si-O bond is about 1.623 Å, one can calculate the distance between O atoms within a GPTS residue unit. The distance is about 2.65 Å as denoted in Figure S2. Secondly, it is reasonable to suppose that the atoms of Si and O in the GPTS residue distribute regularly on the substrate surface and take a platform like that



**Figure S2.** Schematic demonstration of GPTS assembled on glass plate

shown in Figure S3. And then, one can calculate the distance between 1 and 2, and that between 1 and 3. Based upon the acreage of the rectangle, one can get the average area of one Si atom. Clearly, one rectangle shown in Figure S3 contains four Si atoms, which are three Si atoms contained in the rectangle and one from another four Si atoms, situated at vertex of the rectangle, each of which contributed a quarter to the area. Finally, it is supposed that each Si atom binds one pyrene molecule via the spacer and the boundary effect is omissible. In this way, the theoretical density of pyrene groups on the surface can be calculated, which is 5.8 groups per 100 Å<sup>2</sup>. The real density determined by the UV-Vis method is 4.2 groups per 100 Å<sup>2</sup>, and thereby the surface coverage is about 72%.

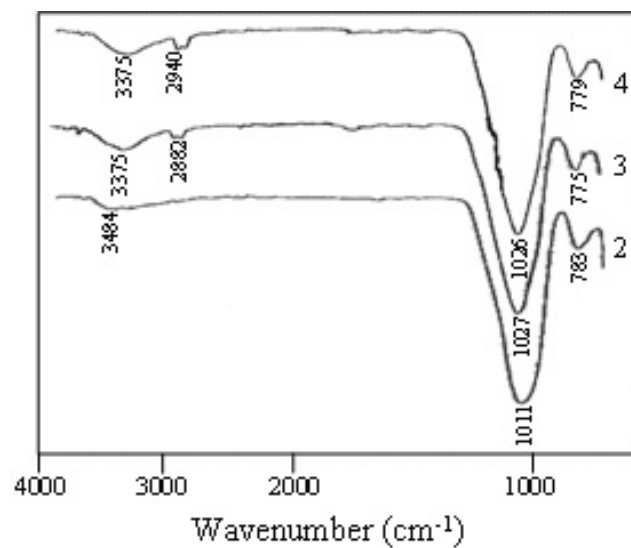


**Figure S3.** Platform of the glass plate functionalized with a self-assembled monolayer of GPTS

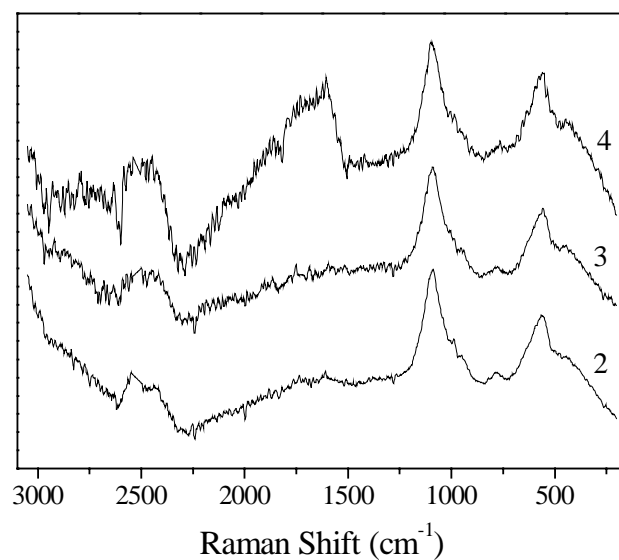
**Table S1.** Advancing Contact Angles ( $\theta$ ) of Various Glass Plate Surfaces and Water

| Glass Plates <sup>*</sup>    | □1□      | □2□      | □3□      | □4□      |
|------------------------------|----------|----------|----------|----------|
| Advancing Contact Angles (°) | 41.4±1.2 | 21.1±1.4 | 55.3±1.6 | 68.4±1.2 |

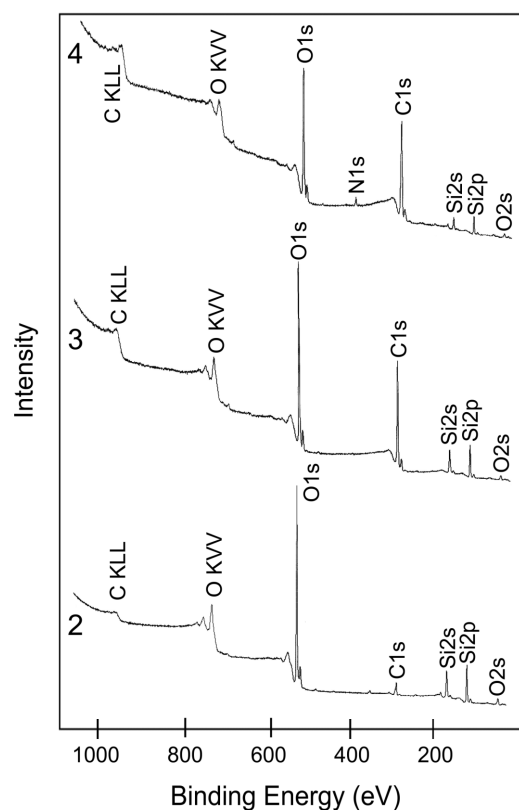
<sup>\*</sup> (1) stands for the original clean glass plate, (2) the activated glass plate with hydroxyl surface, (3) the glass plate with epoxide surface, and (4) the plate with pyrene surface.



**Figure S4.** FTIR spectra of the glass plates of various surface structures. The numbers of 2, 3, 4 have similar meaning with those shown in Table S1



**Figure S5.** Raman spectra of the glass plates of various surface structures. The numbers of 2, 3, 4 have similar meaning with those shown in Table S1



**Figure S6.** X-ray photoelectron spectra of the glass plates of various surface structures. The numbers of 2, 3, 4 have similar meaning with those shown in Table S1

**Table S2.** Dissociation Constants of the Tested Copper Salts

| Copper salts               | $\text{Cu}(\text{Ac})_2$ | $\text{CuSO}_4$       | $\text{Cu}(\text{NO}_3)_2$ | $\text{CuCl}_2$ |
|----------------------------|--------------------------|-----------------------|----------------------------|-----------------|
| Dissociation constants (M) | $7.82 \times 10^{-3}$    | $4.81 \times 10^{-2}$ | $5.43 \times 10^{-2}$      | 0.163           |

The quenching caused by copper salts is static in nature, the dissociation constants are the reciprocal of the quenching constants, which can be calculated from the slopes of the plots shown in Figure 4 of the paper.