

## A Covalently Bonded AlQ<sub>3</sub>/SiO<sub>2</sub> Hybrid Material with Blue Light Emission by A Conventional Sol-Gel Approach

### Supplementary Information

#### Experimental Section

Material Synthesis:

5-formyl-8-hydroxyquinoline (FHQ) was synthesized and characterized following a reported procedure.<sup>18</sup>

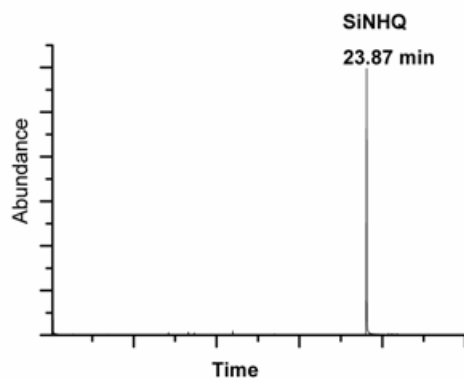
The key step is to obtain a new intermediate product from FHQ. (3-aminopropyl)triethoxysilane (APTES) is picked to react with FHQ, which has a -NH<sub>2</sub> group active to the -CHO group on FHQ. FHQ was dissolved in ethanol, and APTES was added with a molar ratio of 1:1, then refluxed for 12h under stirring in a nitrogen atmosphere. The solvent was then distilled off under reduced pressure, yielding the desired intermediate product: a deep orange oil-like liquid(SiNHQ). This reaction has a yield of 100% (Fig S1) without catalyst. MS: calcd for C<sub>19</sub>H<sub>28</sub>N<sub>2</sub>O<sub>4</sub>Si *m/z*: 376.5, found: 376.1(see Fig S2).

A typical procedure for the preparation of the hybrid material is as follows: SiNHQ was dissolved in *N,N'*-dimethylformide (DMF), and tetraethoxysilane (TEOS) and water was added with a molar ratio 1:50:101.5(SiNHQ:TEOS:H<sub>2</sub>O). The mixture was vigorously stirred for 2h, then the Al<sup>3+</sup> nitrate DMF solution was added to form a homogenous yellow-green solution at once, and a blue emission is visible, which indicates the in situ formation of the aluminum complex. The mixture was stirred at room temperature for another 12h, and then aged at 60°C for 7 days. The xerogel were collected as monolithic bulks (named as HSiAlQ) and ground into powder for characterizations.

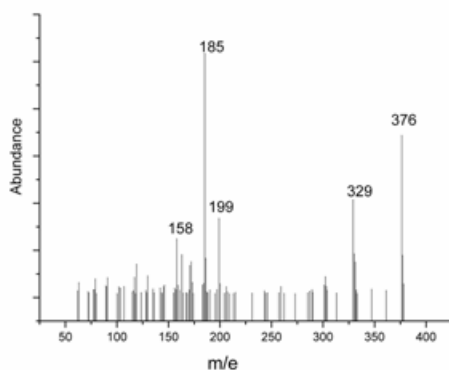
The physically mixed AlQ<sub>3</sub>-SiO<sub>2</sub> material sample (PMAIQ) was prepared by the direct mixing of HQ and Al<sup>3+</sup> with TEOS and water in DMF, and following the same sol-gel procedure with HSiAlQ.

Characterization methods: IR spectra were obtained on a Nicolet 7000-C spectrometer. UV-Vis absorption spectra were recorded on a Shimadzu UV-3101PC spectroscope. Photoluminescent spectra were obtained on a Shimadzu RF-5301PC spectrofluorophotometer. The Mass spectra were recorded on an 6890N GC system attached with Agilent 5973 Mass Selective Detector.

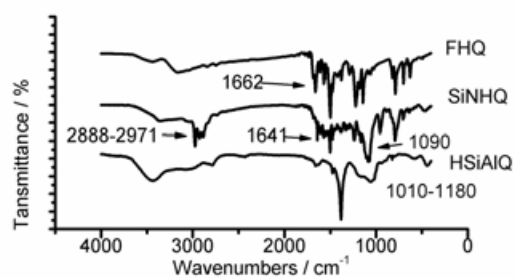
### Spectra:



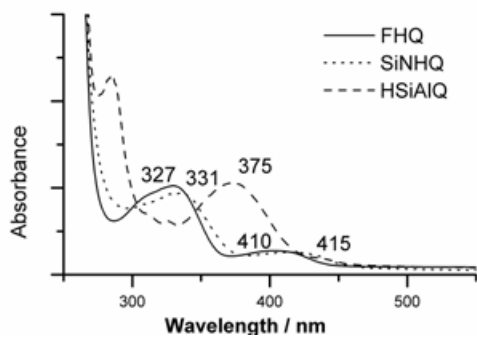
*Fig S1.* GC spectra of SiNHQ



*Fig S2.* Mass spectra of SiNHQ



*Fig S3.* FT-IR spectra of FHQ, SiNHQ and HSiAlQ



**Fig S4.** UV/Visible absorption spectra in DMF solution