

# 文章撰写手册

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逻辑清晰，擅用连词副词；  
表达流畅清晰，句子之间紧密衔接。

# 1、摘要

## Active Fe species of Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 nanowires in N<sub>2</sub>O decomposition

### 1、存在的问题（研究背景）

**Recently, we reported** the hydrothermal conversion of Fe<sub>2</sub>O<sub>3</sub>/SiO<sub>2</sub> spheres (Fe<sub>2</sub>O<sub>3</sub> nanoparticles supported on SiO<sub>2</sub> spheres) into Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 nanowires **in the presence of** ethylenediamine and triethylamine (Micropor. Mesopor. Mater. 200 (2014) 52–60). The catalytic **performance** of Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 nanowires in CO oxidation, N<sub>2</sub>O decomposition, and catalytic reduction of NO by NH<sub>3</sub> **was evaluated. However, the nature of** active Fe species of Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 nanowires in N<sub>2</sub>O decomposition **was not clear.**

### 2、我们的策略

**In the current work,** additional samples (i.e., Fe-Silicalite-1, Fe<sub>2</sub>O<sub>3</sub>/Silicalite-1, and Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1) **were prepared by using** conventional Silicalite-1 as a precursor, **and tested in** N<sub>2</sub>O decomposition.

### 3、结果是什么

Fe<sub>2</sub>O<sub>3</sub>/Silicalite-1 and Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 prepared by impregnation **showed higher activities than** Fe-Silicalite-1 prepared by isomorphous substitution, and Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 nanowires **showed the highest activity among these samples.**

### 4、原因原理是什么

Through relevant characterization employing XRD, XRF, N<sub>2</sub> adsorption, TEM, UV-vis, and <sup>57</sup>Fe Mössbauer spectroscopy, we **conclude that** small Fe<sub>2</sub>O<sub>3</sub> nanoparticles with size of 1–2 nm **are the main active Fe species** for N<sub>2</sub>O decomposition, **whereas** framework Fe<sup>3+</sup> and larger Fe<sub>2</sub>O<sub>3</sub> particles **are not so active.**

# 1、摘要

Flower-like  $\text{Ag}_2\text{O}/\text{Bi}_2\text{MoO}_6$  p-n heterojunction with enhanced photocatalytic activity under visible light irradiation

## 1、我们的策略(合成、表征)

$\text{Ag}_2\text{O}/\text{Bi}_2\text{MoO}_6$  **composed of** flower-like  $\text{Bi}_2\text{MoO}_6$  microspheres (diameter: 1–3  $\mu\text{m}$ ) **and** well dispersed  $\text{Ag}_2\text{O}$  nanoparticles (size:  $\sim 10$  nm) **was prepared via** solvothermal deposition-precipitation. The **catalytic performance** of  $\text{Ag}_2\text{O}/\text{Bi}_2\text{MoO}_6$  and other samples in photocatalytic degradation of Rhodamine B (RhB) and methyl orange (MO) dye under visible light irradiation ( $\lambda > 420$  nm) **was studied**

## 2、结果是什么

$\text{Ag}_2\text{O}/\text{Bi}_2\text{MoO}_6$  p-n heterojunction **exhibited higher activity than**  $\text{Bi}_2\text{MoO}_6$  or  $\text{Ag}_2\text{O}$  **with the same weight of the corresponding component** in  $\text{Ag}_2\text{O}/\text{Bi}_2\text{MoO}_6$ . It was even more active than a mixture of  $\text{Bi}_2\text{MoO}_6$  and  $\text{Ag}_2\text{O}$ .

## 3、原因是什么

The high photocatalytic activity of  $\text{Ag}_2\text{O}/\text{Bi}_2\text{MoO}_6$  **was due to** the efficient separation of photogenerated electron-hole pairs. The photogenerated holes ( $h^+$ ) and superoxide radical anions ( $\cdot\text{O}_2^-$ ) **were found to be** the primary reactive species for the degradation of RhB dye in aqueous solution.

# 1、摘要

Flower-like Ag<sub>2</sub>O/Bi<sub>2</sub>MoO<sub>6</sub>p-n heterojunction with enhanced photocatalytic activity under visible light irradiation

## 1、我们的策略(合成、表征)

Ag<sub>2</sub>O/Bi<sub>2</sub>MoO<sub>6</sub> **composed of** flower-like Bi<sub>2</sub>MoO<sub>6</sub> microspheres (diameter: 1–3 μm) **and** well dispersed Ag<sub>2</sub>O nanoparticles (size: ~10 nm) **was prepared via** solvothermal deposition-precipitation. The **catalytic performance** of Ag<sub>2</sub>O /Bi<sub>2</sub>MoO<sub>6</sub> and other samples in photocatalytic degradation of Rhodamine B (RhB) and methyl orange (MO) dye under visible light irradiation (λ > 420 nm) **was studied**

## 2、结果是什么

Ag<sub>2</sub>O / Bi<sub>2</sub>MoO<sub>6</sub> p-n heterojunction **exhibited higher activity than** Bi<sub>2</sub>MoO<sub>6</sub> or Ag<sub>2</sub>O **with the same weight of the corresponding component** in Ag<sub>2</sub>O / Bi<sub>2</sub>MoO<sub>6</sub>. It was even more active than a mixture of Bi<sub>2</sub>MoO<sub>6</sub> and Ag<sub>2</sub>O.

## 3、原因是什么

The high photocatalytic activity of Ag<sub>2</sub>O/ Bi<sub>2</sub>MoO<sub>6</sub> **was due to** the efficient separation of photogenerated electron-hole pairs. The photogenerated holes (h<sup>+</sup>) and superoxide radical anions (•O<sub>2</sub><sup>-</sup>) **were found to be** the primary reactive species for the degradation of RhB dye in aqueous solution.

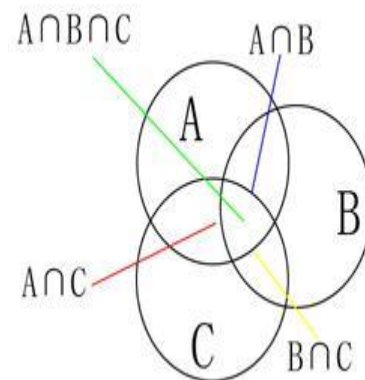
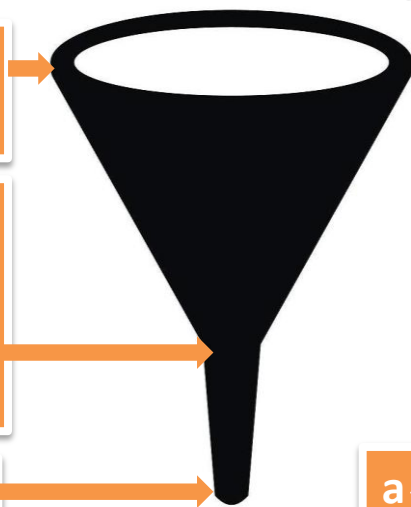


## 2、引言逻辑结构

1、研究目标的优点、应用前景，存在什么问题

2、针对这个问题，别人做了什么工作，得到什么结果，有什么意义，还存在什么问题

3、你的方法又有何特色



a、你的工作和别人的工作并立，属于大领域里面重要的枝干

b、你的工作只是别人的工作的一部分，属于大领域里面小领域的分支，那就需要将这种方法拓展到其他的小领域

提高文章的档次（适用范围较大）

## 2、引言结构-示例

### 1、这个领域应用前景及存在的问题

Supported  $\text{Fe}_2\text{O}_3$  catalysts **have demonstrated applications in** phenol hydroxylation [1,2], dehydrogenation of propane [3,4], CO oxidation [5,6], and catalytic reduction of NO by  $\text{NH}_3$ [7–9]. On the other hand, Fe-containing zeolites also have many applications in the selective oxidation of methane to methanol [10–12], selective oxidation of benzene to phenol by  $\text{N}_2\text{O}$  [13–16], oxidative dehydrogenation of alkanes [17–19], Fenton oxidation [20,21], selective reduction of  $\text{NO}_x$  with hydrocarbons [22–24] or  $\text{NH}_3$ [25–27], and decomposition of  $\text{N}_2\text{O}$  [28–37]. The catalytic activities of these catalysts **are critically influenced by many factors, such as** preparation methods/conditions, nature of Fe species, and FeOx-support interactions, etc. **The nature of active Fe species is complicated, especially when** a catalyst contains several different Fe species, e.g., framework  $\text{Fe}^{3+}$ , isolated  $\text{Fe}^{3+}$ , or  $\text{Fe}^{3+}$  anchored to zeolite framework.

### 2、别人和自己课题组以前采取什么行动或者方法，还有什么问题遗留。

In a previous communication [38], Tang and co-workers proposed a new strategy for the synthesis of single-crystalline  $\text{SiO}_2$  nanowires. In their synthesis,  $\text{Fe}_2\text{O}_3/\text{SiO}_2$  spheres (prepared by impregnation and spray drying) were placed on top of an ethylene-diamine solution in an autoclave and heated. The amorphous  $\text{SiO}_2$  support transformed into crystalline  $\text{SiO}_2$  nanowires, and  $\text{Fe}_2\text{O}_3$  nanoparticles on the support surface was leached by an acid afterwards, leaving behind almost pure  $\text{SiO}_2$  nanowires for blue light emission.

We continued that work [38], and found that  $\text{Fe}_2\text{O}_3/\text{SiO}_2$ spheres can be transformed into  $\text{Fe}_2\text{O}_3/\text{Fe-Silicalite-1}$  nanowires via hydrothermal treatment in a mixture of ethylenediamine and trimethylamine [39]. **This synthesis is interesting, because** (i) amorphous  $\text{SiO}_2$  can be transformed into crystalline Silicalite-1, a zeolitic microporous material; (ii)  $\text{SiO}_2$  spheres can be transformed into Silicalite-1 nanowires; (iii)  $\text{Fe}_2\text{O}_3$  nanoparticles on the support surface become smaller due to the leaching of some Fe species during the synthesis; (iv) a small portion of  $\text{Fe}^{3+}$  species enter the Silicalite-1 framework. The resulting catalyst showed 100% conversion in  $\text{N}_2\text{O}$  decomposition at  $500^\circ\text{C}$ . Considering that (i) a small portion of  $\text{Fe}^{3+}$  incorporated into the Silicalite-1 framework during the hydrothermal synthesis and (ii)  $\text{Fe}_2\text{O}_3/\text{SiO}_2$  spheres (prepared by impregnation of  $\text{Fe}(\text{NO}_3)_3$  onto  $\text{SiO}_2$  spheres followed by calcination) showed very low activity, we **tentatively ascribed** the activity of  $\text{Fe}_2\text{O}_3/\text{Fe-Silicalite-1}$  nanowires to framework  $\text{Fe}^{3+}$ [39]. **Nevertheless, clear elucidation of the nature of active Fe species is still needed.**

### 3、针对这个问题你采用什么（巧妙的、聪明的、系统的）方法；最后你得到什么结果（包括结果的内容和意义）

framework  $\text{Fe}^{3+}$  species; (ii)  $\text{Fe}_2\text{O}_3/\text{Silicalite-1}$  (prepared by impregnation using conventional Silicalite-1 as a support) containing only supported  $\text{Fe}_2\text{O}_3$ ; (iii)  $\text{Fe}_2\text{O}_3/\text{Fe-Silicalite-1}$  (prepared by impregnation using conventional Fe-Silicalite-1 as a support) containing both framework  $\text{Fe}^{3+}$  and supported  $\text{Fe}_2\text{O}_3$ . Through detailed characterization and a comparison of the catalytic performance, **we conclude that** small  $\text{Fe}_2\text{O}_3$  nanoparticles of 1–2 nm are the main active Fe species, **whereas** framework  $\text{Fe}^{3+}$  and larger  $\text{Fe}_2\text{O}_3$  particles are not so active.



# 2、引言-段落结构-1

## 1、应用前景 (研究价值)

Supported  $\text{Fe}_2\text{O}_3$  catalysts **have demonstrated applications in** phenol hydroxylation [1,2], dehydrogenation of propane [3,4], CO oxidation [5,6], and catalytic reduction of NO by  $\text{NH}_3$ [7–9]. **On the other hand**, Fe-containing zeolites **also have many applications in** the selective oxidation of methane to methanol [10–12], selective oxidation of benzene to phenol by  $\text{N}_2\text{O}$  [13–16], oxidative dehydrogenation of alkanes [17–19], Fenton oxidation [20,21], selective reduction of  $\text{NO}_x$  with hydrocarbons [22–24] or  $\text{NH}_3$ [25–27], and decomposition of  $\text{N}_2\text{O}$  [28–37].

## 2、性能的影响因素

The catalytic activities of these catalysts **are critically influenced by many factors, such as** preparation methods/conditions, nature of Fe species, and  $\text{FeO}_x$ -support interactions, etc.

## 3、存在的问题

**The nature of active Fe species is complicated, especially when** a catalyst contains several different Fe species, e.g., framework  $\text{Fe}^{3+}$ , isolated  $\text{Fe}^{3+}$  or  $\text{Fe}^{2+}$  anchored to zeolite frame-work, dinuclear Fe-O-Fe species, oligomeric Fe oxo species, small  $\text{FeO}_x$  nanoparticles, and bulk  $\text{FeO}_x$  particles.

## 2、引言-段落结构-2

### 1、方案1

In a previous communication [38], Tang and co-workers **proposed a new strategy for** the synthesis of single-crystalline SiO<sub>2</sub> nanowires. In their synthesis, Fe<sub>2</sub>O<sub>3</sub>/SiO<sub>2</sub> spheres (prepared by impregnation and spray drying) were placed on top of an ethylene-diamine solution in an autoclave and heated. The amorphous SiO<sub>2</sub> support transformed into crystalline SiO<sub>2</sub> nanowires, and Fe<sub>2</sub>O<sub>3</sub> nanoparticles on the support surface was leached by an acid afterwards, leaving behind almost pure SiO<sub>2</sub> nanowires for blue light emission.

### 2、方案二

**We continued that work** [38], **and found that** Fe<sub>2</sub>O<sub>3</sub>/SiO<sub>2</sub>spheres can be transformed into single-crystalline SiO<sub>2</sub> nanowires via hydrothermal treatment in a mixture of ethylenediamine and trimethylamine **because** (i) amorphous SiO<sub>2</sub> can be transformed into crystalline Silicalite-1 nanowires; (ii) Fe<sub>2</sub>O<sub>3</sub> spheres can be transformed into Silicalite-1 nanowires; (iii) Fe<sub>2</sub>O<sub>3</sub> nanoparticles can be transformed into Silicalite-1 nanowires due to the leaching of some Fe species during the synthesis; (iv) a small amount of Fe<sup>3+</sup> can be incorporated into the Silicalite-1 framework. The resulting catalyst showed 100% conversion in N<sub>2</sub>O decomposition. **ascribed** the activity of Fe<sub>2</sub>O<sub>3</sub>/Fe-Silicalite-1 nanowires to framework Fe<sup>3+</sup>[38].

### 3、仍然存在的问题

**Nevertheless, clear elucidation of the nature of active Fe species is still needed.**

## 2、引言-段落结构-3

### 我们的方案

In the current work, we **additionally prepared** three different Fe-containing Silicalite-1 samples: (i) Fe-Silicalite-1 (prepared by isomorphous substitution) **containing only** framework  $\text{Fe}^{3+}$  species; (ii)  $\text{Fe}_2\text{O}_3$ /Silicalite-1 (prepared by impregnation using conventional Silicalite-1 as a support) **containing only** supported  $\text{Fe}_2\text{O}_3$ ; (iii)  $\text{Fe}_2\text{O}_3$ /Fe-Silicalite-1 (prepared by impregnation using conventional Fe-Silicalite-1 as a support) **containing both** frame-work  $\text{Fe}^{3+}$  and supported  $\text{Fe}_2\text{O}_3$ .

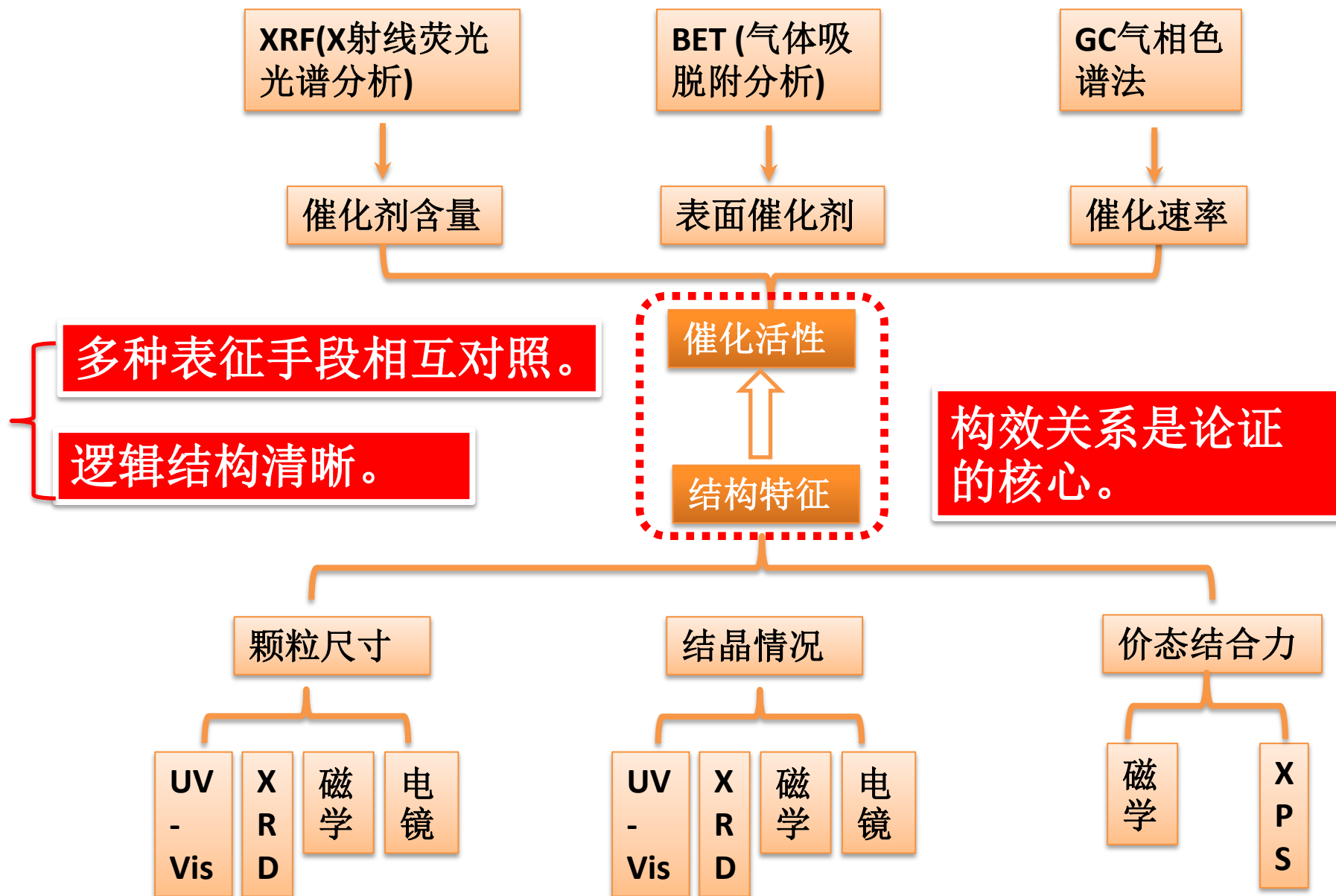
a、做了什么及为什么做，针对性强，逻辑框架清晰

### b、结论

Through detailed characterization and a comparison of the catalytic performance, **we conclude that** small  $\text{Fe}_2\text{O}_3$  nanoparticles of 1–2 nm are the main active Fe species, **whereas** framework  $\text{Fe}^{3+}$  and larger  $\text{Fe}_2\text{O}_3$  particles are not so active.



# 3、讨论部分逻辑结构



# 3、讨论部分段落结构

1、主题句（为什么做这个实验或者表征）

2、表征结果以什么形式给出

3、观察到什么现象，说明什么（浅层次）

XRD

a、多个峰位——晶型

b、相对峰强——晶形

c、峰宽——晶体尺寸

c、峰的位置——间距

4、所有现象汇总，物理本质是什么（深层次）

XRD and FTIR **are applied to further investigate structural variation** from M-CA complex to O-doped g-C<sub>3</sub>N<sub>4</sub>.

**Figure 2a shows** the XRD patterns of M-CA complex, M-CA mixture, and their polycondensation products.

The **appearance of new peaks** for M-CA complex compared with M-CA mixture can be viewed as a **solid evidence for** the occurrence of new arrangement. The high crystallinity noted in the XRD pattern of M-CA complex strongly **suggests** that the M-CA complex possesses a hexagonal structure. According to the hexagonal structure model of M-CA supramolecular complex proposed by Rao, **three obvious peaks at 10.67, 11.90 and 18.41** may be assigned to (100), (010), and (110) of the in-planar pattern, respectively. **Apparently**, another two peaks at 21.41 and 23.80 are precisely corresponding to crystal faces of (200) and (020), respectively. **Furthermore**, the **strongest diffraction peaks** observed at 27.92 is well assigned to the lamellar stacking peak of (002) crystal plane, **supporting** the observed sheet-like structure (see Figure 1a). **In addition**, no peaks of melamine or cyanuric acid have been detected in M-CA complex, **indicating** a complete reaction of melamine and cyanuric acid through the solution mixing process. **Obviously**, the XRD pattern of M-CA mixture presents no other diffraction peaks except for those of melamine and cyanuric acid, **confirming** a simple physical mixing of melamine and cyanuric acid. For both

These results could **be interpreted as** the lattice distortion and the delocalization of  $\pi$ -conjugated bonds due to the introduction of oxygen heteroatoms.

repeating units and the interlayer distance of stacking g-C<sub>3</sub>N<sub>4</sub> sheets, respectively. **It is notable that, with a close observation** (Figure 2b), the **full width at half maximum (FWHM)** of (110) peak for O-gCN enlarges from 0.45 to 0.6 compared with gCN. **Moreover**, the (002) peak in O-gCN shifts from 27.43 to 27.23.

充分挖掘表征结果背后的结构信息。



# 4、结论

## 1、做了什么

This paper **described** the synthesis, characterization, and catalytic behavior of Au/Cab-O-Sil fumed SiO<sub>2</sub> and Au/MO<sub>x</sub>/SiO<sub>2</sub> catalysts synthesized using Au(en)<sub>2</sub>Cl<sub>3</sub> as the precursor.

## 2、结果是什么

The novel preparation method **resulted in** small and welldispersed gold nanoparticles on SiO<sub>2</sub> supports. These Au/SiO<sub>2</sub> catalysts **were** highly active for CO oxidation below room temperature.

## 3、原因原理是什么

The pretreatment of as-synthesized Au/SiO<sub>2</sub> in H<sub>2</sub>-Ar at 150 8C and in O<sub>2</sub>-He at 500 8C **is** beneficial for high activity. The optimum gold loading was in the range of 1.1 and 2.5 wt.%. The post-treatment of calcined (and activated) Au/SiO<sub>2</sub> in different media influenced the activity in CO oxidation. The calcined Au/SiO<sub>2</sub> might be deactivated during the storage in ambient environments, but could be regenerated via recalcination. The addition of metal oxide dopants can be used to tune the catalytic performance as well.

## 4、有什么意义（评价）

Considering the fact that highly active Au/SiO<sub>2</sub> catalysts are scarce, this report **furnishes new perspective for** this subject, and provides new possibilities for following X-ray absorption, spectroscopic, in situ HRTEM experiments and first-principle calculations.