

DETECTION OF REDUCING GASES

In the wet atmosphere
 $2SO_2 + 2H_2O + O_2 \leftrightarrow 2H_2SO_4$

In the dry atmosphere
 $SO_{2(gas)} + O_{2(ads)}^- \rightarrow SO_{4(gas)} + e^-$

interaction directly with metal sites
 $MO_{surface} + SO_{2(gas)} \rightarrow MSO_{3surface}$

Increase the electron concentration
 $H_2 \leftrightarrow 2H^+ + 2e^-$

In the oxygen atmosphere
 $2H_2 + O_{2(ads)}^- \leftrightarrow 2H_2O + e^-$
 $H_2 + O_{(ads)}^- \leftrightarrow H_2O + e^-$

Acts as an electron donor

$2NH_3 + 3O_{ads}^- \rightarrow N_2 + 3H_2O + 3e^-$

OR

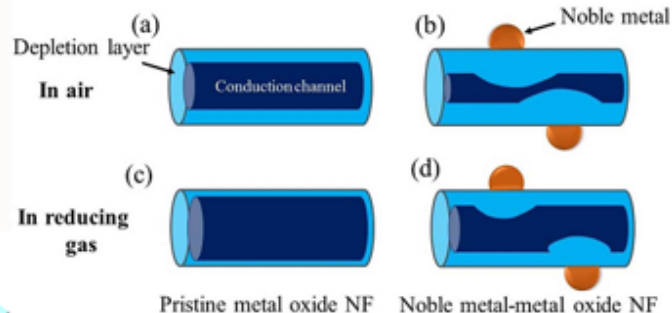
$4NH_3 + 3O_{2(ads)}^- \rightarrow 2N_2 + 6H_2O + 6e^-$

$2NH_3 + 4O_{ads}^- \rightarrow N_2O + 3H_2O + 4e^-$
 $2NH_3 + 5O_{ads}^- \rightarrow 2NO + 3H_2O + 5e^-$

20

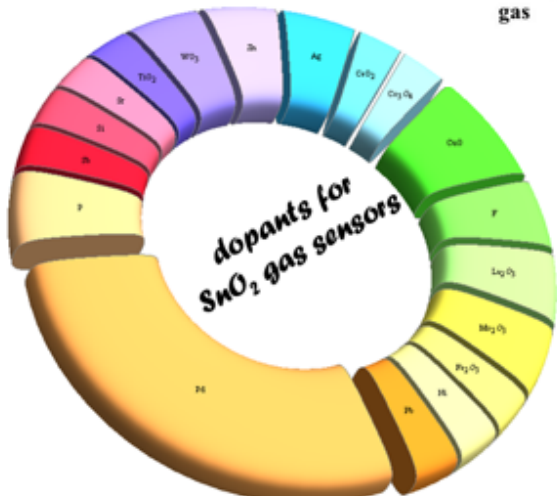
P. Shankar and J. B. B. Ravappan, Sci. Lett. J 4, 126 (2015).

Noble metals possess high electrical conductivity to facilitate electron transfer and catalyze the oxidation of reducing gas molecules. In addition, metal oxide NFs have a large surface area to provide efficient catalytic particle dispersion and a porous structure to promote gas flow.



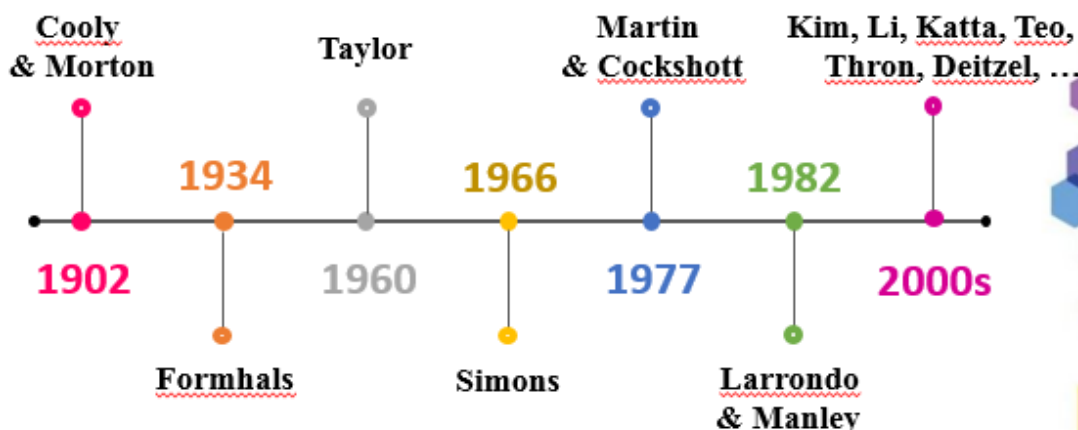
Pristine metal oxide NF Noble metal-metal oxide NF

Change of conduction channel in metal oxide NFs due to presence of noble metal; (a) pristine metal oxide NF in air, (b) noble metal-metal oxide NF in air, (c) pristine metal oxide NF in reducing gas atmosphere, and (d) noble metal-metal oxide NF in reducing gas atmosphere.



Relative comparison of dopants for SnO₂ gas sensors

تاریخچه الکترورسی

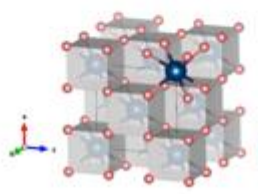
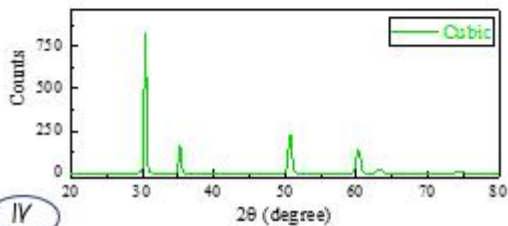
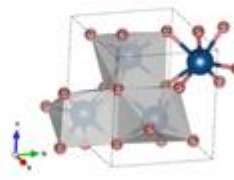
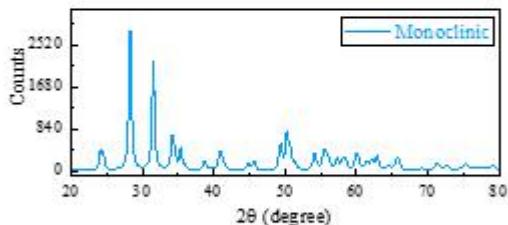
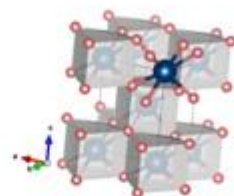
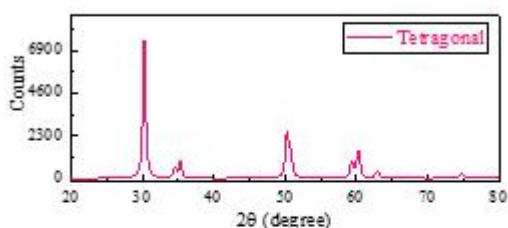


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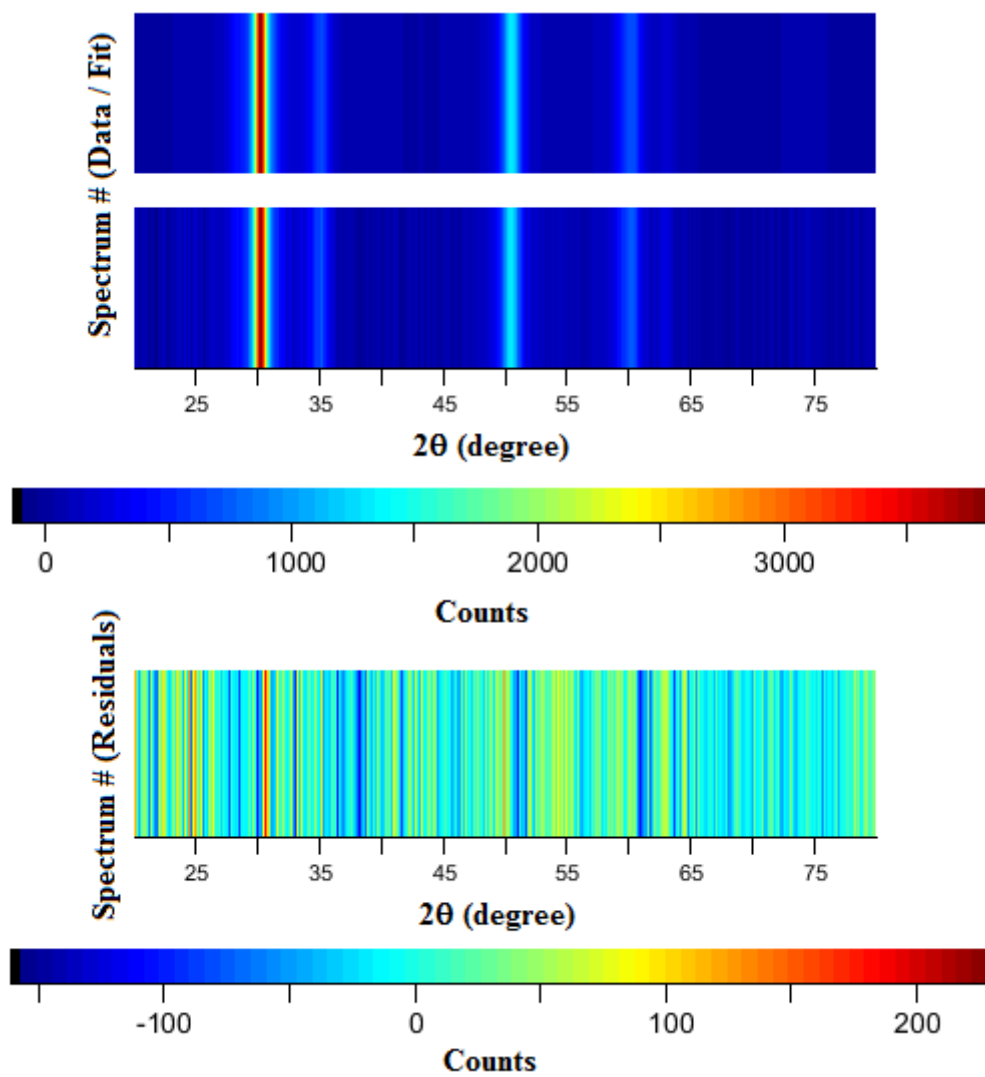
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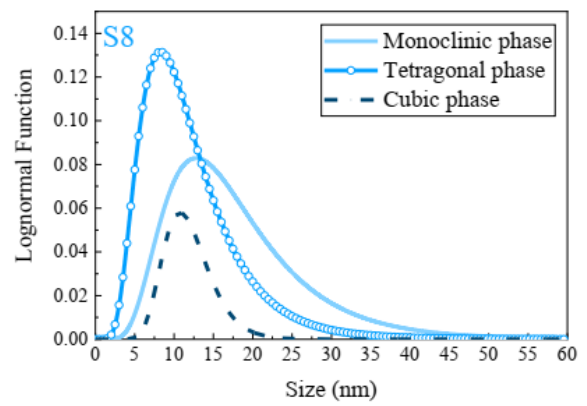
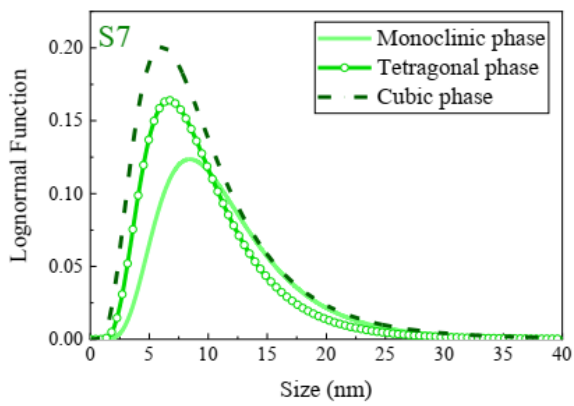
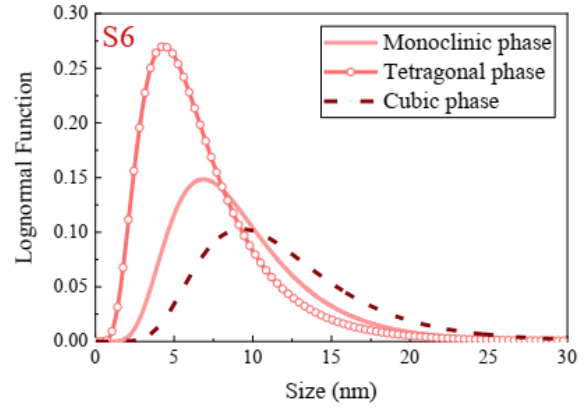
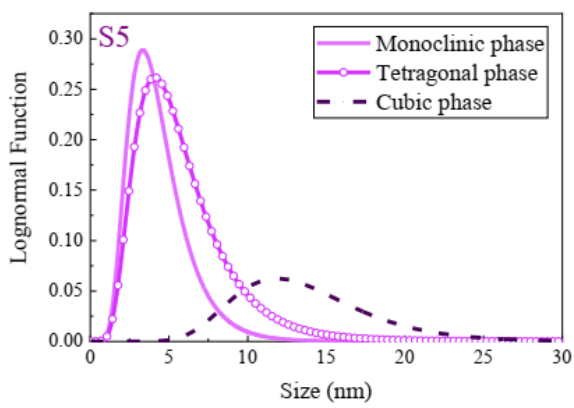
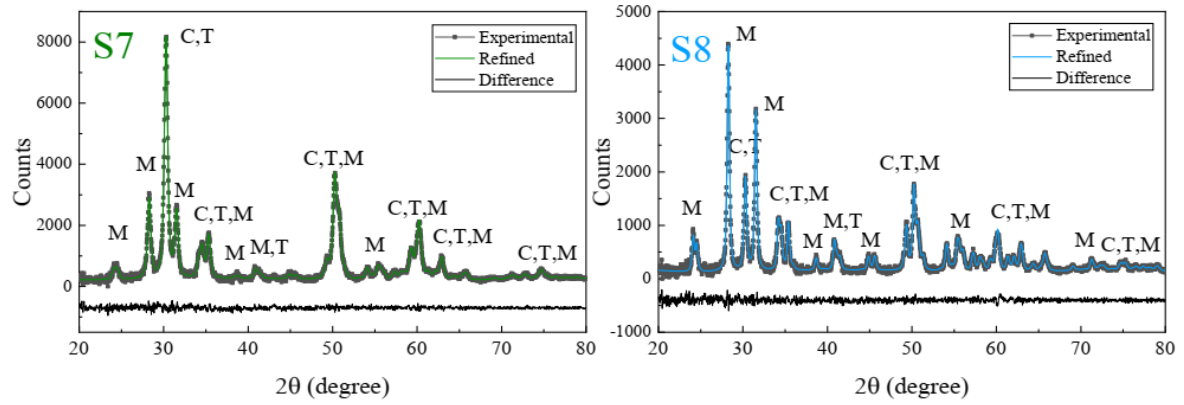
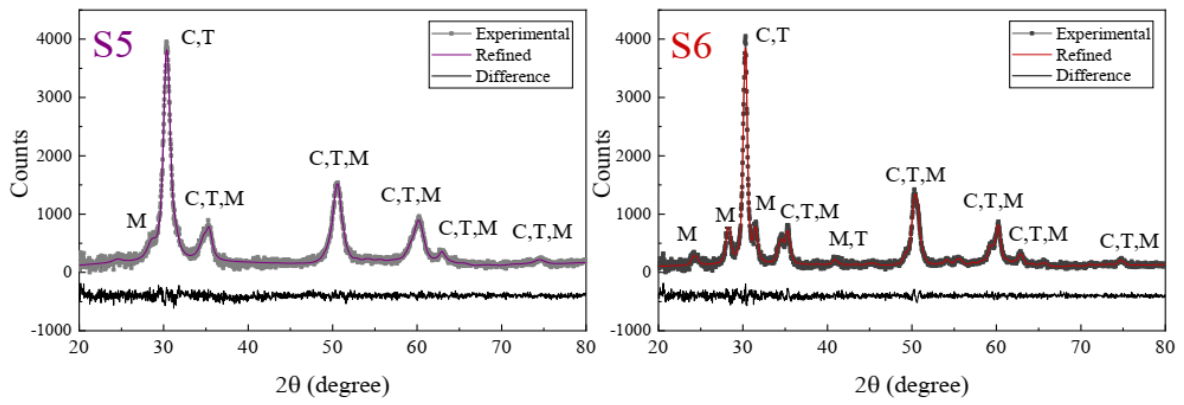
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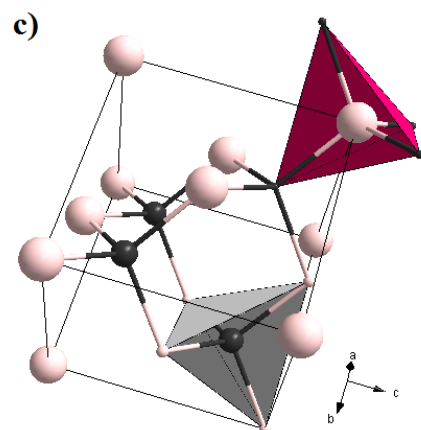
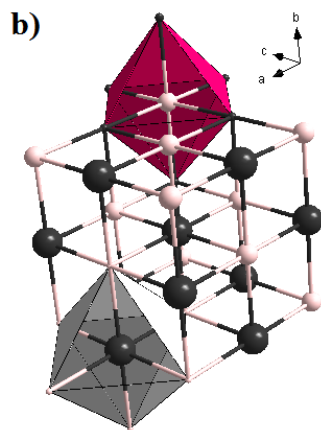
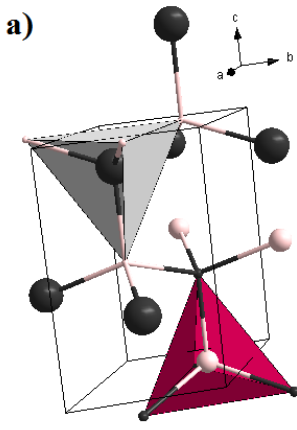


IV

نمونه تحلیل XRD







نمونه تدریس

فشار پیمانه ای فشار ناشی از شاره فشار جو

فشار کل یا مطلق $P = P_0 + \rho gh$ \rightarrow $P - P_0 = \rho gh$

توازن فشار در لوله U شکل

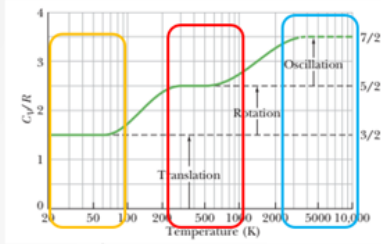
$$P_A = P_B \Rightarrow \rho_1 g h_1 + \rho_2 g h_2 + P_0 = \rho_3 g h_3 + \rho_4 g h_4 + P_0$$

جو سنج جیوه ای
برای اندازه گیری فشار جو به کار می‌رود.

$$\left. \begin{matrix} P_a = P_b \\ P_a = P_0 \end{matrix} \right\} P_0 = P + \rho gh \xrightarrow{P=0} P_0 = \rho gh$$

5

نمودار تغییرات C_V/R بر حسب دما برای گاز هیدروژن (دو اتمی)



| Molecule | Example | C_V |
|------------|---------|--|
| Monatomic | Ideal | $\frac{3}{2}R = 12.5$ |
| | Real | He 12.5 |
| Diatomic | Ideal | $\frac{5}{2}R = 20.8$ |
| | Real | N ₂ 20.7 |
| Polyatomic | Ideal | $3R = 24.9$ |
| | Real | NH ₄ 29.0 CO ₂ 29.7 |

مثال: مقدار انرژی را به صورت گرما به یک گاز دو اتمی می‌دهیم و اجازه می‌دهیم گاز در فشار ثابت منبسط شود. مولکول‌های این گاز به دور یک محور دوران می‌کنند اما نوسان نمی‌کنند. چه مقدار از انرژی 1000J موجب افزایش یافتن انرژی درونی گاز می‌شود؟ از این مقدار انرژی چقدر به انرژی جنبشی انتقالی مولکول‌ها و انرژی جنبشی دورانی مولکول‌ها تبدیل می‌شود؟



$$C_V = \frac{5}{2}R \quad \& \quad C_P = \frac{7}{2}R \quad \quad Q = nC_P\Delta T \Rightarrow \frac{7}{2}nR\Delta T = Q \Rightarrow nR\Delta T = \frac{2}{7}Q$$

$$\Delta E_{int} = nC_V\Delta T = \frac{5}{2}nR\Delta T = \frac{5}{2} \times \frac{2}{7}Q = \frac{5}{7}Q = 714.3J$$

$$\Delta K_{tran} = \frac{3}{2}nR\Delta T = \frac{3}{2} \times \frac{2}{7}Q = \frac{3}{7}Q = 428.6J$$

$$\Delta K_{rot} = \Delta E_{int} - \Delta K_{tran} = \frac{5}{2}nR\Delta T - \frac{3}{2}nR\Delta T = nR\Delta T = \frac{2}{7}Q = 285.7J$$