

**A stable Nanogold catalysts and a mini-type mine self-rescuer for CO filter are ready for large-scale commercialization**

Market sector(s): Chemistry, Safety

Type of opportunity: Collaboration or Licensing Opportunity

**Description:**

On the basis of 16 years' R&D experience, the Institute of Applied Catalysis in Yantai University, Shandong, China has developed a novel stable gold catalyst (YD-2) with a gold loading of about 1.1 wt%. Our proprietary catalysts can completely convert 1vol% CO in the temperature range -25 to -15°C with very good reproducibility for each batch and are stable for 500 hours in a feed of 1% CO in air with a space velocity of  $15900\text{h}^{-1}$ , stable after 2 months direct exposure in air, stable for 150 hours in a hydrogen-rich stream and stable for more than 5 years when stored in a desiccator. A mini-type mine self-rescuer which uses our catalyst for CO removal as the key component has been designed by one of our industrial partners: this is superior to current commercially available mine rescue equipment based on hopcalite catalyst both in its performance and having a significantly smaller size and weight. Our mask comfortably meets the demanding standard of the European EN403 code criteria and China GA209-1999. The catalyst has been evaluated for use in a standard filtering respiratory protective device by three Chinese Organizations, i.e. Changsha Mine Safety Equipment Supervision Center, Shanxi Xinhua Chemical Corporation limited and Foshan Nanhai Jinling Safe Guarding Equipment Factory under conditions at inlet gas concentrations of 0.25-1.5 vol % CO, 30/85/95LPM, 92-96% RH and ambient temperature. The residual concentration of CO is <100ppm and the inhalation temperature is  $\leq 45^\circ\text{C}$ . An example of the results achieved in the Fushan Factory is given in Figure 1.

Both our catalysts and the corresponding mine self-rescuer are ready for commercialization on a large scale. 80% gold can be loaded to the support in preparation and gold can be recovered from the spent catalyst using our

techniques.



P. R. CHINA



## A Minitype Mine Self Rescuer for CO Filter

*Application of Supported Nanogold Catalyst*



## Factory on-site simulation of YD-2 On a standard Filtering Respiratory Protective device

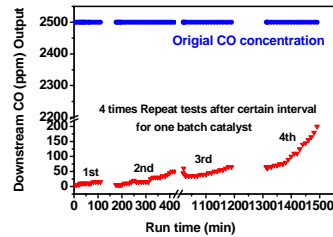


Figure 1 --- Approx. 2500ppm CO in air, 92 ± 2%RH, 25 ± 1°C, 43373h<sup>-1</sup> GHSV  
YD-2 catalyst (0.8-1.5mm in diameter): 22g; Bed: 65mm diameter  
Pressure Drop (breathing resistance determined at 95LPM): 420Pa

## A minitype Mine self-rescuer for CO filter Super than all other products

Only 16-20g YD-2 needed; Light (T.W. ca.120g)  
Compact, portable; Low heat release,  
Low inhalation resistance, comfortable



The CO-FSR(AZL-200)  
by SANCOM



## Current Available Mine Self Rescuers

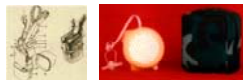
Using Hopcalite Catalyst (Cu-Mn Composites) & dryer  
Cumbersome, bulky (ca.1200g); High heat release;  
High inhalation resistance, uncomfortable



Filter Self Rescuer 950 Dräger, German ZL60L Mine Self Rescuer, China



## Technical Data



Technical Data	Dräger FSR 950	Suncom FSR AZL-200
Height (mm)	138	45
Cross-section area (cm <sup>2</sup> )	94	80
Weight (g)	1060	120
Weight on head/mouth (g)	690	80
Time before admission of 100ppm (min) (0.25-1.0vol.%CO)	App.160	200
Inspired air temperature with 1.5vol.%CO	≤85°C	<45°C
Inhalation resistance: unused after 120min under test conditions	≤ 600Pa ≤ 800Pa	<200Pa <600Pa

## Related Patents

- An Li-Dun, et al. Yantai University, P. R. China  
CN ZL 00 1 22829.3; 31 Dec 2003  
CN ZL 03 138786.1; 14 June 2006  
WO 2006 /007774 A1, 26 Jan 2006  
CN ZL 200410024509.6; 28 May 2008
- Zhang Wei, Shanxi SunCom Sci.&Tech. Corp. Ltd.  
CN ZL 2610953Y; 2004

## Key Benefits

- \*\*Preparation process: high efficiency in Au capture; simple, easy and environment friendly; recycle of gold.
- \*\*Various applications in gas mask, fire escape hood, CO<sub>2</sub> laser
- \*\*The designed gas mask is very compact, comfortable, cheap and easy carrying.

## Commercial Opportunity

The Yantai University and Shanxi Suncom Sci. & Tech. Corp. Ltd. is seeking commercial partners for collaborative development or licensing of the technologies for gold catalyst and gas mask.

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