

## Respiratory protective device development featuring gold catalyst technology

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Catalysts consisting of gold nano-particles dispersed on metal oxide supports (such as Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, FeO<sub>x</sub>) offer highly efficient oxidation of toxic carbon monoxide (CO: IDLH level 1200 ppm) to carbon dioxide (CO<sub>2</sub>: IDLH level 40 000 ppm) at varying environmental conditions [1]. In addition, gold catalysts have been reported to partially oxidise other toxic gasses such as acrolein, formaldehyde and NO<sub>x</sub> at room temperature [2, 3, 4].

Over the past 10 years Mintek's Advanced Materials Division (AMD) has been developing gold granulate and monolith catalysts for a number of commercial and environmental applications. Mintek, in collaboration with a South African medical device manufacturer, is currently developing respiratory protective devices to meet various international standards.

Existing respiratory protection technology makes use of activated carbon materials to absorb toxic contaminants, and Hopcalite catalyst (Cu/MnO<sub>x</sub>) to oxidise carbon monoxide, but these only offer protection for a short period (15 min) as Hopcalite deactivates rapidly in the presence of moisture. In addition, these devices require large volumes of material as compared to gold catalyst technology.

Pressure drop is also an important consideration in respiratory applications as breathing resistance is critical in high work (heavy breathing) situations such as fire escape or wildland firefighting [5]. The low pressure drop offered by monolith technology makes it ideal for application in respiratory protection.

### References

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