

## Gold catalyst support for H<sub>2</sub> generation that reaches a 100% CO conversion

Spanish public research organisations have developed a new gold catalyst for the **Water Gas Shift Reaction (WGSR)** useful for the production and/or purification of H<sub>2</sub> for applications in fuel cells. It is a catalyst capable of working at low temperatures in the range in which the reaction is thermodynamically more efficient. It has a high stability and ease of regeneration.

*An offer for Patent Licensing*

### Maximum efficiency of conversion of CO in H<sub>2</sub>

A key aspect to the technical-economic development of fuel cells, especially those operating at low temperatures like PEMFC (polymer electrolyte membrane fuel cell) or those used in mobile application (eg vehicles), is the design of catalysts suitable for the processes of production and purification of hydrogen, such as WGSR (Water Gas Shift Reaction) to produce much more active and selective hydrogen than the hydrogen currently used in industry.

The product patented is a new support, for a gold catalyst, whose formula is: CeO<sub>2</sub>-MO<sub>x</sub>/Al<sub>2</sub>O<sub>3</sub>. The gold is deposited on the support by NH<sub>3</sub> assisted direct anion exchange method. The catalyst developed has numerous advantages over other types of catalysts as well over gold catalysts using other supports.

The main advantage over traditional catalyst is that it can operate at low temperatures where the WGSR is much more efficient, resulting in a reaction yield greater than that achieved with existing catalysts. Additionally, some of the catalysts usually used (the HTS: "High Temperature Shift", based on Fe<sub>2</sub>O<sub>3</sub> and Cr<sub>2</sub>O<sub>3</sub>, and LTS: "Low Temperature Shift", based on Cu/Zn-oxides) are extremely pyrophoric when activated by reduction; the patented catalyst is not.

The catalyst developed has an activity in the hydrogen production reaction, WGSR, better than others gold based systems described in the literature, at medium temperatures (250-350°C), achieving a complete CO conversion.



*"Catalyst for H<sub>2</sub> production from CO with high efficiency at low temperature and cheaper than other gold catalysts"*

### Main innovations and advantages

- The most important advantage of this type of catalysts is that they operate at low temperatures (T <150 ° C), range in which the WGS reaction is thermodynamically more efficient.
- Compared with other gold catalysts, the catalyst developed has a better activity in the hydrogen production reaction, achieving a complete CO conversion.
- Also the catalyst provides high stability with respect to the existing gold catalysts.
- The catalyst has lower price because of the high alumina content (80% approximately) and a half in gold (2%) compared with existing gold catalyst.
- The patented catalyst is readily regenerated by heating in an oxidizing atmosphere.
- With respect to other catalysts, the gold catalyst has the advantage of not being pyrophoric, and thus allows safe work in all conditions.
- The pretreatment is also easier than with other catalysts and can be exposed to air.
- It is highly resistant to periods of work-stoppage.

### Patent Status

Spanish patent application filed.

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