

A novel type of catalyst for the selective oxidation of CO

Market sector(s): Energy, Chemistry

Type of opportunity: Collaboration or Licensing Opportunity

Scientists of the Leiden University have developed a novel catalyst to selectively reduce CO levels in presence of H₂ at temperatures and conditions well suitable for hydrogen production in industrial applications.

Hydrogen is one of the most attractive and clean energy sources for the future, as upon oxidation only water and energy are produced. However, the production and storage of hydrogen in an efficient and safe manner still poses major limitations for general use.

One way to overcome the storage problem is to produce hydrogen locally from gasoline, methanol or natural gas via steam-reforming, or partial oxidation combined with water-gas shift reaction processes. Optimally, only H₂ and CO₂ will be products of such processes. However, in practice CO contaminates the product stream by 1 to 2%. CO is not only toxic, but it also leads to poisoning of the platinum-based catalysts, which are generally used, resulting in decreased efficiencies of the hydrogen production process.

We discovered that a catalyst comprising gold particles dispersed on an alumina or zirconia support combined with CeO_x and Li₂O can selectively oxidise CO into CO₂ in the presence of H₂. The multicomponent catalyst almost completely converts CO into CO₂ at 50°C. Most importantly, the CO conversion remains stable at almost 100% at temperatures relevant to hydrogen-air polymer electrolyte membrane (PEM) fuel cells, i.e., between 60 and at least 150 °C, while the selectivity to CO₂ decreases only slightly. In addition, we showed that our catalyst performs better than any other available catalysts under conditions relevant for industrial application, such as high H₂ and O₂ concentrations and high flow rates. Our invention includes ways to prepare the catalyst and includes hydrogen PEM fuel cells containing the catalyst.

Key Benefits

Enhanced efficiency and productivity of hydrogen PEM fuel cells.

Selective oxidation of CO in presence of H₂ in a large range of temperatures relevant for industrial applications.

Applications

Hydrogen PEM fuel cells containing the catalyst can be applied in multiple industrial settings and usages, e.g., for vehicle propulsion and auxiliary power units.

Patent status

For this invention a European Patent has been filed (application number 04078447.2).

Commercial Opportunity

The Leiden University is seeking commercial partners for collaborative development or licensing of this platform technology.

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