

NEW CATALYST FOR THE DECOMPOSITION OF NITROUS OXIDE (N₂O) TO INNOCUOUS GASES

P PATENTED TECHNOLOGY

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ABSTRACT

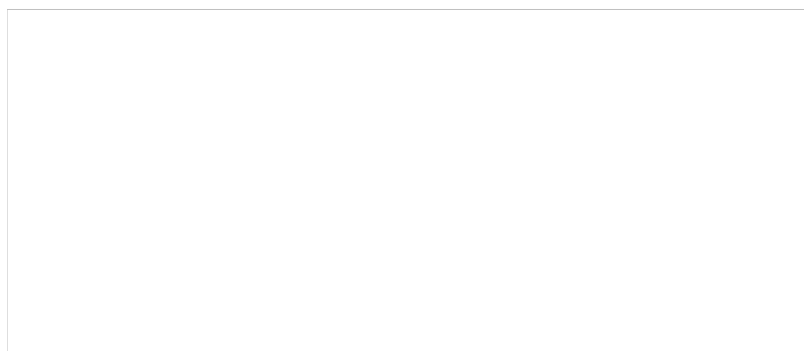
The research team "Carbon materials and environment" at the Department of Inorganic Chemistry at University of Alicante has developed a novel, active, effective and long-term stable catalytic system for removing and/or reducing nitrous oxide by direct decomposition to harmless products (oxygen and nitrogen). This catalytic system is useful for complex waste gases coming from industries, combustion plants or vehicles exhaust gases (petroleum or diesel engines). It is characterized by allowing the treatment of diluted N₂O streams (500-5000 mg/L) at low temperatures (< 525°C), even in the presence of inhibiting gases (O₂, NO_x, H₂O, etc.). It has been successfully tested in a nitric acid plant.

The research team is looking for companies interested in acquiring this technology for its commercial exploitation.

ADVANTAGES AND INNOVATIVE ASPECTS

The main advantages of this technology are:

- New, active, effective and stable catalytic system in real operating conditions at industrial scale.
- Their activity remained constant over time irrespective of the working conditions employed.
- Apart from the catalytic activity, other physical-chemical properties (crystalline structure of the mixed oxide, catalyst surface area, Rh particles size and Rh oxidation state) also kept nearly constant after more than 40 non-consecutive hours of catalytic assays in real operating conditions in a nitric acid manufacturing plant.



Images taken using transmission electron microscopy. Left: Fresh catalyst; Right: Catalyst used during 40 non-consecutive hours in a N₂O decomposition assay in a nitric acid manufacturing plant. As it can be observed, the rhodium particles size (approximately 1-2 nm) is not modified during the assay.

The main innovative aspect of this invention in comparison with the commonly used for these purposes is its ability for working at oxidant atmosphere in presence of inhibiting gases (such as O₂, NO_x y H₂O) at 300°C or higher temperatures.

MARKET APPLICATIONS

This invention refers to a novel, effective, active and stable catalytic system able to remove N₂O by direct decomposition to O₂ and N₂ in complex waste gases such as:

- Chemicals manufacturing plants (Nitric acid, adipic acid, caprolactam, acrylonitrile, glyoxal, etc.).
- Processes in which nitric acid or ammonia are used as oxidant agent.
- Combustion processes of fossil fuels (carbon, biomass, wastes, etc).
- Vehicles emissions (petrol engines, diesel engines, etc.)
- Others.

These kinds of effluents are characterized by containing a low N₂O concentration (between 500-500 mg/L) at temperatures less than 525°C and in the presence of inhibiting gases (O₂, NO_x, H₂O...).

COLLABORATION SOUGHT

The research group is looking for companies interested in acquiring this technology for its commercial exploitation.
