Technology Readiness Level: 5
Component and/or Breadboard Validation in Relevant Environment

Eltron Research & Development

Tech Brief

Catalysts for Complete Oxidation of VOCs at Low Temperatures

Cost-effective VOC abatement, regulatory mandate compliance

The Problem

Traditional, non-catalytic methods for removing VOCs require either special equipment and high operating temperatures or secondary processing steps that are expensive to implement and maintain. Catalytic destruction of VOCs is less complicated, more efficient and has the potential to be less costly than traditional methods.

The Solution

Eltron Research & Development has developed multi-component, metal oxide catalysts that destroy VOCs in air at lower temperatures than conventional catalysts which require temperatures of 800℃ and higher. Wit h catalytic formulas defined for optimal oxygen surface mobility, resistance to poisoning, multiple oxidation states and oxidation reactions, Eltron's catalysts completely convert VOCs to CO_2 and water at just 150℃. Eltron has also developed metal oxide support materials for noble metal containing analogs. These catalysts enable complete destruction of VOCs at 100℃ by promoting catalytic combustion through enhanced synergy with small amounts of noble metal.

The Benefits

Eltron's catalysts help reduce the cost of VOC abatement through improved performance, and by eliminating or minimizing expensive noble metals such as platinum from the catalytic formula. Estimated costs of Eltron's catalyst are $1-$10/lb while costs of catalysts containing precious metals range from $100-$200/lb and higher. Eltron's catalyst system help reduce operating expenses, energy use and capital costs. The by-products, CO_2 and H_2O, are environmentally benign and easily handled.

Benefits

- Reduce costs for VOC abatement
- Perform better than other existing technologies
- Do not require noble metals, reducing capital investment
- Destroy VOCs at temperatures as low as 100℃ (and also at higher temperatures)
- Help manufacturers address regulatory mandates
- Easily integrate into legacy abatement systems
- Resist poisoning

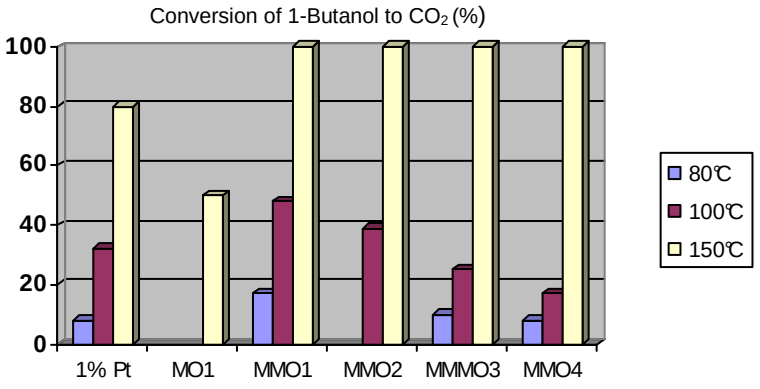
Applications include destruction of:

- Olefins (ethylene, propylene, etc.)
- Aliphatics (propane, butane, etc.)
- Ethane
- Aromatics
- Oxygenates (ketones, alcohols, aldehydes, etc.)
- Halogenated hydrocarbons
- Organophosphonates
- Organosulfides
- CO
- Ammines
- Waterborne Organics

Bench-scale prototype of Eltron's catalytic filter for VOC destruction.

Another advantage is that Eltron's catalysts can be deposited onto standard filters and so they are easily incorporated into existing systems. During development, Eltron determined the ideal amount of catalyst that should be coated onto the filter so that a balance between the thickness of the catalyst layer and the resulting pressure drop across the filter is achieved.

With Eltron's catalysts, vehicle and appliance manufacturers as well as fabricators in many, varied industries now have a more cost-effective solution for meeting environmental regulations and lowering cost of operations. Additionally, their lower cost makes them applicable to smaller businesses that require VOC abatement such as drycleaners, restaurants and even in residential air decontamination systems.



Graph showing activity for complete conversion of 1-butanol to CO_2 at 80℃, 100℃, and 150℃. The 1% Pt catalyst (supported on Al_2O_3) is included for comparison. MO1 indicates a single-component metal oxide, and MMO1, MMO2, MMO3, and MMO4 indicate multi-component metal oxides derived from MO1. The 1-Butanol concentration was ~100 ppm in air and the space velocity was ~6,000 hr-1.

Stage of Development

Eltron has a related patents and patent applications filed with the USPTO:

- 6,458,741 *Catalysts for Low-Temperature Destruction of Volatile Organic Compounds in Air*
- 6,787,118 *Selective Removal of Carbon Monoxide*
- 7,329,359 *Application of Catalysts for Destruction of Organic Compounds in Liquid Media*
- 12/257,811 *A Metal Oxide System for Adsorbent Applications*

Contact Us

To learn more about Eltron's catalysts and the many other technologies that the company is researching and commercializing, visit www.eltronresearch.com.

To discuss the possibility of entering into a business relationship with Eltron, contact the Business Development Group at business@eltronresearch.com.

Eltron Research & Development

Eltron Research & Development Inc.
Eltron Research & Development Inc. invents and commercializes novel technologies involving advanced materials, energy, water and environmental systems.

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