



## Perovskite Adsorbents for Warm-Gas Removal of Sulfur

### *Achieving the next level of sulfur removal*

For technologies such as fuel cells, mechanisms used to produce Fischer-Tropsch liquids and processes that produce substitute natural gas (SNG) from synthesis gas, produce parts per *million* (ppm) levels of sulfur that rapidly poison catalysts used in fuel cells. Sulfur segregating to grain boundaries embrittles metals and is an issue in sulfur-contaminated, hydrogen-powered turbines. For many technologies, concentrations of sulfur must be lowered to 1-2 parts per *billion* (ppb) by volume or *better*. Commercial sorbents based upon zinc lower concentrations of sulfur to the ppm by volume level and are limited by release of hydrogen sulfide by reaction of zinc sulfide with steam.

#### **Innovation**

Sorbents that complement zinc-based materials and protect H<sub>2</sub> transport membranes.

#### **Benefits**

- Achieves low part per billion by volume concentrations of sulfur in steam
- More tightly binds sulfur relative to common zinc-based sorbents
- Complements zinc-based sorbents and takes over where zinc oxide leaves off
- Catalytically adsorbs and dissociates hydrogen sulfide

#### **Eltron's Solution**

Eltron's proprietary, novel composites more strongly bind sulfur relative to zinc. Eltron has developed sorbents that complement zinc-based sorbents and bring levels of sulfur from the ppm to the ppb level, providing hydrogen transport membranes that enable ultimate purification of hydrogen. Dense hydrogen transport membranes purify hydrogen to the highest levels, but membranes based upon palladium tolerate sulfur only at 1-2 ppb by volume.

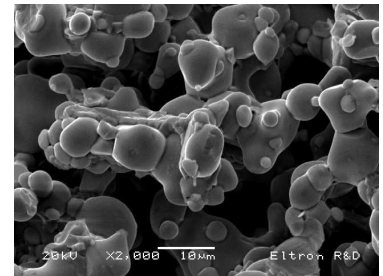
#### **Features**

For rapid sulfur uptake, the new sorbents are designed for the catalytic adsorption and dissociation of hydrogen sulfide that escape zinc-based sorbents, while keeping the vapor concentration of H<sub>2</sub>S below 1-2 ppb, even in the presence of steam. This aids many processes plagued by interactions with sulfur. For ultimate purification of hydrogen, hydrogen transport membranes, teamed with the sorbents, are used for final clean-up of residual impurities.

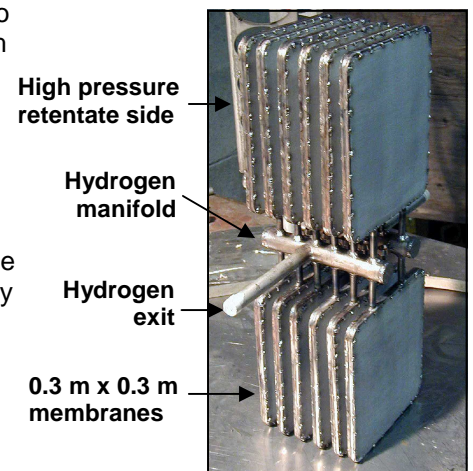
#### **Stage of Development**

A prototype system has been completed.

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Scanning electron microscope image of Eltron's sulfur sorbents.



Palladium-based hydrogen transport membranes to be used in hydrogen fueling stations during the 2010 Winter Olympics in Vancouver.



**Eltron Research & Development Inc.**

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