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**Battelle Number(s):**

13151-E

Patent(s) Issued

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Available Technologies

# Microchannel Vaporizer with Low Gas Side Pressure Drop

## SUMMARY

Researchers at PNNL have developed a novel heat transfer structure useful for vaporizing liquids using a heat supplied by a hot gas stream; the vaporizing liquid and hot gas flow through the device in a cross-flow configuration similar to a radiator. However, unlike a radiator, which relies on the high thermal conductivity of aluminum fins to enhance the heat transfer from a small primary area, this device uses microchannels within the walls of the structure providing a high degree of primary heat transfer area. The structure is formed by etching and then bonding stainless steel laminates. Construction in stainless steel provides excellent high temperature compatibility and allows high temperature steam to be generated if desired. The etched pattern that forms the vaporizing channel includes features that stabilize the flow pattern of the vaporizing liquid, providing a uniform flow distribution and improving the heat transfer. A non-preheated liquid can be fed to produce a superheated vapor in a single step. Alternatively, the device can be used to produce a saturated vapor. The very low internal volume results in very rapid transient response for applications which require a rapid dynamic control of the rate of vapor production.

## ADVANTAGES

Highly compact and light weight

Very low gas side pressure drop

Produce superheated vapor from cool liquid in a single step

Very small liquid inventory in the exchanger

Rapid dynamic response of vapor rate to changes in liquid feed rate

Capable of very high pressure operation

## STATE OF DEVELOPMENT & AVAILABILITY

The technology was developed to provide an efficient vaporizer to support compact power systems for military, automotive, and remote applications. For example, the device can be effectively utilized to vaporize water, gasoline, and other hydrocarbons to support portable power applications including fuel cells.



### Patents & Intellectual Property

- » Patent #: 6,994,829

### Technology Portfolio(s)

- » Energy
- » Energy Conversion
- » Fuel Cells
- » PEM
- » SOFC
- » Microtechnology
- » Microsystems
- » Hydrogen Generation

### Potential Industry Applications

- » Aerospace & Defense
- » Automotive & Transportation
- » Chemicals
- » Energy & Utilities
- » Oil & Gas

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