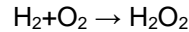




## Microreactor for the Direct Vapor Phase Generation of Hydrogen Peroxide

Eltron Research & Development Inc. and its STTR partner, the Florida Institute of Technology (FIT), have demonstrated what is, to their knowledge, the first reactor technology for the direct vapor phase generation of hydrogen peroxide from hydrogen and oxygen:



The single plate microreactor employed to this point has the appearance shown in **Figure 1**. A numbered up microreactor unit has the appearance shown in **Figure 2**.



**Figure 1. 3-D view of microreactor with all gas, coolant and thermocouple ports.**



**Figure 2. Numbered up microreactor unit for direct VHP.**

The following has been found:

- The highly exothermic and vapor phase  $\text{H}_2\text{O}_2$  production by direct reaction between pure  $\text{H}_2$  and  $\text{O}_2$  in an explosive mixture could be easily carried out in the microreactor – without temperature runaway problems.
- Synthesis of  $\text{H}_2\text{O}_2$  *directly* in the vapor phase (vaporous hydrogen peroxide – VHP) in a microreactor was demonstrated. No published report on direct VPH prior to these studies is known. All reports found so far are on liquid phase synthesis.
- $\text{H}_2$  conversion as high as 33% and  $\text{H}_2\text{O}_2$  selectivity as high as 21.5% were achieved in separate experiments.
- Product stream  $\text{H}_2\text{O}_2$  content close to 5,000 ppmv (direct  $\text{H}_2\text{O}_2$  concentration), which corresponds to 0.85 wt%, could be achieved in these very preliminary runs – far greater than the target  $\text{H}_2\text{O}_2$  content of 250–500 ppm currently sought by the DoD for vapor phase  $\text{H}_2\text{O}_2$  chemical/biological decontamination.



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