

## Characteristics of honeycomb oxidizing catalysts to recover tritiated hydrogen and methane gases

T. Uda<sup>a,\*</sup>, M. Tanaka<sup>a</sup>, T. Wajima<sup>b</sup>, K. Munakata<sup>b</sup>

<sup>a</sup>*National Institute for Fusion Science, Oroshi, Toki-shi Gifu 509-5292, Japan*

<sup>b</sup>*Akita University, Faculty of Engineering and Resource Science, Tegata gakuen-machi, AKITA, 010-8502, Japan*

For large volume air cleanup processing system in a nuclear fusion facility, honeycomb catalysts offer a useful advantage in terms of their low pressure drop. In the previous study, applicability of honeycomb catalysts for oxidation of hydrogen and methane gases in air which presumed to contain tritium was examined. Then it was found that Pt is suitable for hydrogen oxidation and Pd is for methane oxidation respectively. Further to improve the optimum catalysts parameter experiments of precious metal weighing ratio and base material were examined. In the present study the catalysts used were Al-Cr-Fe metal alloy or NA ceramic honeycombs on which surface the precious metals Pt or Pd were deposited. The weight ratio of precious metal Pd were varied from 0.1 g/L to 4g/L. Experimental gas was normal pressure air including each 0.1% of hydrogen and methane gases. The catalyst was heating up to 400 °C, and oxidizing reaction rate was evaluated from the ratio of hydrogen or methane concentration in inlet and outlet gases measured by gas chromatography. As results large precious metal weight was effective to get high oxidizing reaction rate around room temperature. But in high temperature over 100 °C, the oxidizing rate of hydrogen proceed even in less weight ratio of the precious metal. On the other hand methane oxidizing reaction rate much depended on the Pd weight ratio. In case of low weight ratio, even heating up the temperature the oxidization rate did not remarkably increase. In addition surface characteristics such as pore size and base honeycomb materials would be influence on the oxidizing property. It would be concluded that the honeycomb oxidizing catalyst has advantage to be alternative to a conventional particles packed bed of catalyst for tritiated gas cleanup system considering various factors of operating conditions. Further more honeycomb system would be essential when combining with the honeycomb absorber as dehumidifier.