

Catalyst Coatings for Methane Combustion in Micro Heat Exchangers

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For catalytic combustion of methane, one of two flow paths was washcoated with a mixture of 10 wt.% Pd/ γ -Al₂O₃ powder and alumina sol. The coated catalyst layer was present in 5-10 μ m of thickness, which was not uniform in the alumina layers. The catalyst coated on the microchannels was characterized in physical properties such as surface area and structure. The fabricated catalytic micro heat exchangers were evaluated in the efficiency of heat exchange. Temperature difference between inlet and outlet of the micro heat exchanger was examined with varying air flowrate. For catalytic combustion of methane, inlet concentration of methane was varied from 0.4 vol. % to 3.8 vol. % in air. Outlet temperatures and conversion of methane were measured with increasing temperature of the micro heat exchanger. Also, pre-heating effect of the reactants on conversion was investigated with increasing temperature of the micro heat exchanger.