

# **Integrated temperature microsensors for the characterization of gas heat transfer**

**Alice Vittoriosi, Juergen J Brandner and Roland Dittmeyer**

Karlsruhe Institute of Technology, Institute for Micro Process Engineering,  
Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

E-mail: [alice.vittoriosi@kit.edu](mailto:alice.vittoriosi@kit.edu)

## **Abstract**

A new method for the integration of silicon-based miniaturized sensors in microchannel systems is proposed. Unlike existing designs realized with IC-technologies, the new design allows flexible integration of temperature sensors in a variety of microchannel materials. Since no bonding technology is required, it is possible to employ the same sensor array with different test sections, broadening the possible applications of the experimental device. The designed experimental device has been employed for the characterization of gaseous heat transfer in microchannels. Conventional temperature measuring technique and CFD simulations have been employed to compare the obtained results and validate the new experimental approach. The local measurement technique enables investigating the influence of the channel material and local surface characteristics (i.e., roughness) on the heat transfer performance at varying flow conditions.