

## Preface

The selected papers published in this issue were presented at the 6th International Workshop on Catalytic Combustion (IWCC6), held in Ischia in September 2005. The Workshop continued the tradition of previous meetings which had took place in Seoul (2002), San Diego (1999), Amsterdam (1996), Tokyo (1994) and Menlo Park (1992).

While catalytic combustion is today a consolidated benchmark for the abatement of VOC emissions, it is still in its early stage as a commercial technology for the production of heat and energy. However, outstanding emission performances obtained in lab, field and first commercial demonstrations attract a strong interest of several industrial players, particularly in the area of gas turbine combustors. In this respect recent results obtained during in field tests on a 10MWe-class GT machine equipped with a Catalytica XONON module have been reported by G. Nutini and co-workers (GE-Nuovo Pignone). Novel results related to other applications with commercial potential of catalytic combustion for heat and energy production, such as radiant fiber burners and cooking plates have been also presented.

New impulse towards commercialisation has been derived from the development of catalytic combustors operating under rich conditions: they can generate  $H_2$  enriched streams able to stabilise homogeneous reactions and secure minimum emissions when integrated in gas turbine combustors. Moreover, rich catalytic combustion has great potential in other areas including fuel cells and after-treatment and cold start up technologies for automotive applications. The general characteristics of the process have been presented in a keynote lecture by Luca Basini (ENITECNOLOGIE), based on his experience in the industrial development of catalytic partial oxidation for syngas production. Specific issues related to the integration of this process in ultra-low emissions gas turbines have been described in contributions by W.C. Pfefferle and co-workers (Precision Combustion Inc.) and by S. Eriksson et al. (KTH-Stockholm-Alstom Power Technology). Other relevant contributions on this topic have been presented mainly by academic researchers.

Both lean and rich catalytic combustion are still very stimulating fields for fundamental research. The unique combination of needing of very active and stable catalytic materials integrated with design solutions which can handle interacting heterogeneous/homogeneous reactions and mass/

heat/momentum transfer processes covering a temperature range from 300 °C to 1400 °C, poses a severe multidisciplinary challenge which requires contributions from material and catalysis scientists, chemical and mechanical engineers, combustion specialists. Several fundamental issues have been extensively covered at the Workshop and reported in this issue, including: understanding of complex behaviour of PdO based catalysts, development of novel materials and preparation methods for high-T combustion catalysts, theoretical investigation on heat and mass transfer processes, kinetic studies and mathematical modelling. A comprehensive keynote lecture on this latter topic has been presented by Yannis Mantzaras (Paul Scherrer Institute).

Finally, several contributions have been presented concerning catalytic combustion for the abatement of VOC emissions. Such contributions have been particularly focused on the abatement of methane emission from compressed natural gas engines and high-T or ultra-lean applications. A link to the more general issue of catalytic oxidation in control of vehicle exhaust emissions has been provided in a keynote lecture by Martin Twigg (Johnson Matthey).

As a whole more than 120 scientists from industries and academies of 30 countries have attended the conference. We would like to thank all the authors who demonstrate that there is still a vivid interest in catalytic combustion.

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