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Catalysis Today 26 (1995) 215

CATALYSIS TODAY

Preface

Catalytic combustion has received much attention during the past decade as an alternative to conventional thermal combustion for diminishing the emission of nitrogen oxides and improving the combustion efficiency simultaneously. This issue of *Catalysis Today* contains the selected papers presented at the *International Workshop on Catalytic Combustion*, which was held in Tokyo, April 18–20, 1994. Its objective was to provide an international forum to bring together scientists to exchange new ideas in materials, mechanisms, and applications in catalytic combustion systems. The papers selected for this issue deal with aspects of catalytic combustion particularly under high temperature.

The following features of high temperature catalytic combustion are well known as compared with flame combustion. (1) Catalytic combustion can be carried out over a wide range of fuel concentrations in air and at low temperatures. (2) These low temperatures result in attaining NO_x emission levels substantially lower than those possible with conventional combustion. (3) The volumetric heat release rates of catalytic combustors are high to be comparable with the conventional gas turbine combustors.

Heterogeneous catalytical gas phase combustion or catalytically stabilized combustion was first proposed by Dr. W.C. Pfefferle in 1971. In the catalytic combustor reactors the adiabatic flame temperature of the fuel–air mixture values to ignite and sustain gas phase combustion. Gas phase reaction at the catalyst surface propagates into the bulk stream and significantly increases the overall reaction rate.

In this system, target temperatures will be in the range of 1000–1400°C. Conventional oxidation catalysts, such as noble metals and transition metal oxides, are not resistant to such severe operating conditions. Therefore, it will be necessary to optimize the design of these catalysts for practical use.

The high temperature catalytic combustors for gas turbines will be reviewed in this issue of *Catalysis Today*. Clearly, the concepts and strategies for developing the catalyst materials and the combustion systems are quite different from those for conventional catalysts and combustion systems.

We would like to express our heartfelt thanks to all authors for their efforts and cooperation. We also thank Dr. M. Ohtaki for arrangement of these manuscripts.

Hiromichi Arai
Hisashi Fukuzawa

SSDI 0920-5861(95)00141-7