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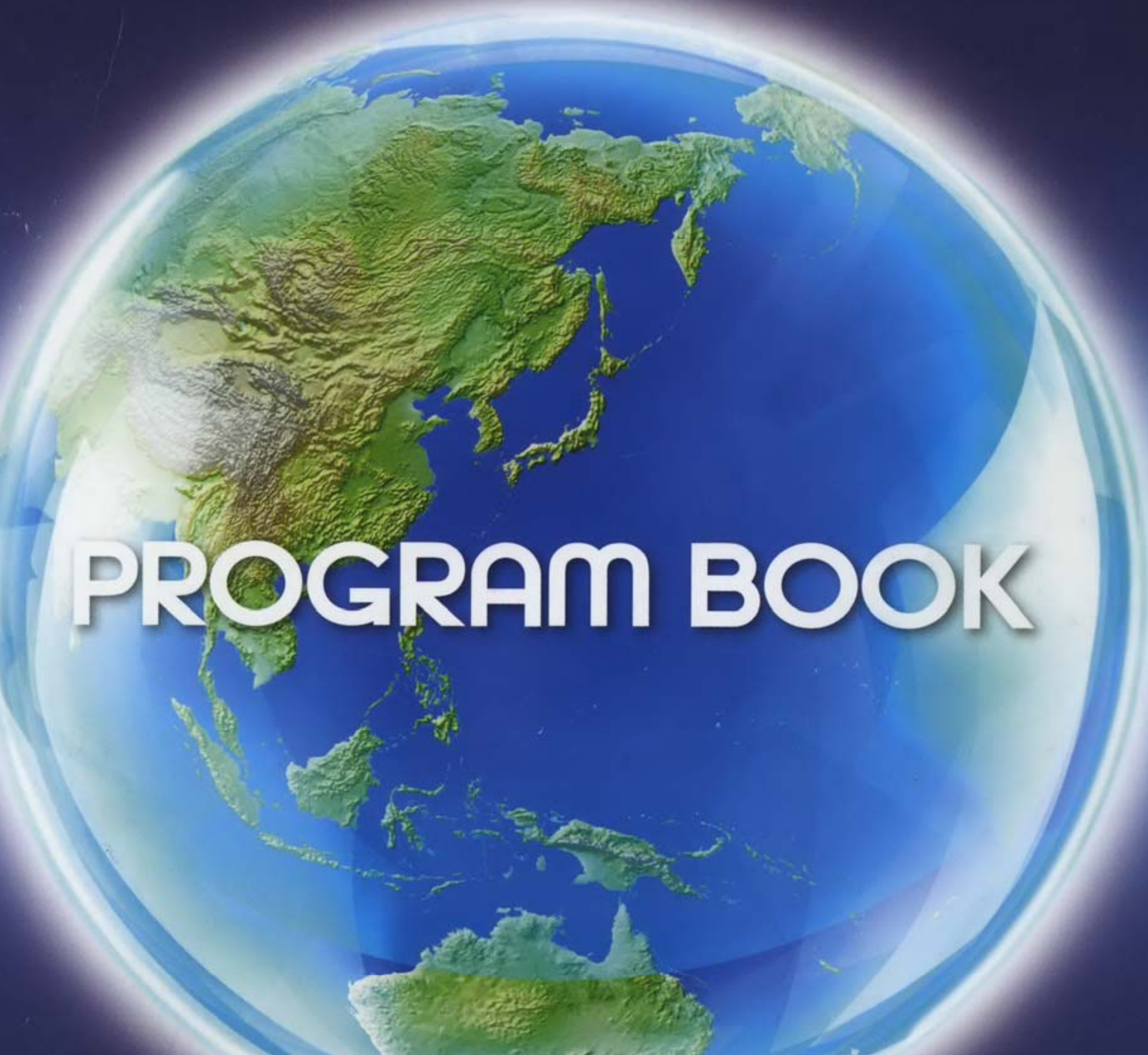

PROGRAM BOOK

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Generation Condition of Discharge in Honeycomb Catalyst

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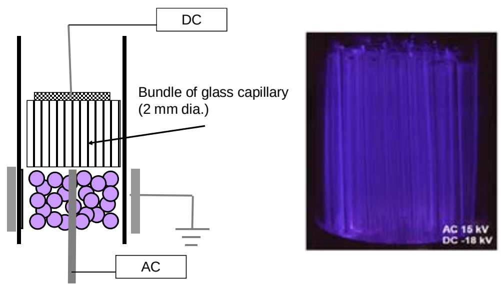
Various types of atmospheric pressure discharges have been developed for electrostatic processes and for plasma chemical processes, such as removing particles, cleaning exhaust gas and volatile organic compounds(VOCs), etc.[1-4]. In order to improve selectivity and energy efficiency of plasma chemical processes, combination of plasma and catalyst is effective. For example, catalyst pellets can be used in packed bed discharge to improve removal efficiency of nitrogen oxides and VOCs[5-6]. Honeycomb is a commonly used geometry of catalysts. It has been difficult to generate electrical discharge evenly inside a honeycomb[3]. If discharge is generated inside a honeycomb, larger surface area can be obtained with lower pressure drop for improved chemical reactions.

There are several important works recently reported. One is the superposition of surface discharge and ac discharge to obtain large discharge volume[5]. Surface discharge is generated on inner wall of a cylinder, and an ac voltage is applied between the centered electrode and the electrode placed on the inner wall for the surface discharge. The other is a sliding discharge, that has been used to cover large surface area of wings of airplane to stabilize airflow[7]. Surface discharge is generated using a pair of electrodes placed between a sheet of insulator film. The other electrode is set apart from the electrode for surface discharge on the film, and energized with negative DC. From the surface discharge, streamers are extended by the DC electric field, and cover the large surface area.

In order to ionize honeycombs consisting of fine channels, a packed-bed discharge is used in front, and DC electric field is applied across the honeycomb. As shown in the figure, this electrode configuration enables the ionization of the fine channels (1 mm square) of a honeycomb made of cordierite.

In this study, conditions for establishing plasma inside a bundle of transparent glass capillary tubes (inner diameter 1 or 2mm) that simulates the channels of honeycomb catalysts, has been studied. This is because the glow associated with the discharge can be visualized in this setup. Preliminary results of NO removal from diesel exhaust will also be presented.



Honeycomb Discharge in a bundle of glass capirally

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