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S6 Microdischarges in Ceramic Foams and Honeycomb Monoliths

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Atmospheric pressure non-equilibrium microplasmas are very attractive for various applications, such as surface modifications, and environmental and biomedical treatment. The atmospheric microplasmas can be generated by various types of electric discharges, including microhollow cathode and capillary plasma electrode discharges, discharges in porous ceramics and capillaries or dielectric barrier or coplanar discharges. The paper presents two types of discharges – a capillary microdischarge in porous ceramic foams and a sliding discharge inside the capillaries of honeycomb monolith – and describes their basic physical properties. Microdischarges inside the ceramics of the specific pore size develop from the surface barrier discharge, in case the amplitude of the applied voltage reaches given threshold. Sliding discharge inside honeycomb capillaries is produced by a combination of AC driven barrier discharge inside catalytic pellet bed coupled in series with DC powered honeycomb monolith. Both discharges produce the relatively cold microplasmas with high level of non-equilibrium. The basic characteristics of the discharges, addressing the effects of the applied voltage, discharge power, pore size, length and diameter of the capillaries, are discussed. The atmospheric microplasmas produced by the presented discharges and utilized in a plasma-catalytic system are considered to have a high potential for effective flue gas treatment.

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