

Abstract Submitted
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Plasma propagation in a plasma-enhanced packed bed reactor (PE-PBR) at different length scales¹ ZAKA-UL-ISLAM MUJAHID, Jazan University, Ruhr-University Bochum, JULIAN SCHULZE, Ruhr-University Bochum, Dalian University of Technology — Plasma-enhanced packed bed reactor (PE-PBR) has multiple micro and mesoscopic voids/cavities where the plasma is generated. The plasma propagation in Packed Bed Reactors (PBRs) is complex due to the existence of multiple length scales i.e. the size of the plasma reactor typically in macroscale, size of pellets macro-mesoscale and the size of the void/cavity between the pellets and pores on the surface meso-microscale. In this work, plasma propagation at these length scales have been experimentally investigated using phase and space resolved optical emission spectroscopy in a simple design with 55 12 mm diameter hemispherical pellets arranged in an organized structure operated in helium gas. It was observed that plasma is generated as only filamentary microdischarges at the position of minimum gap at low voltages while at higher voltages, surface microdischarges are also generated in the void between the pellets. Zooming in the void between the pellet, each surface microdischarge is found to be generated as multiple microscopic bright structures. Increasing the voltage amplitude increased the sharpness of these surface microdischarge structures. In the complete reactor, strong interaction between adjacent cavities results in wave-like emission propagating from the center to the edges.

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