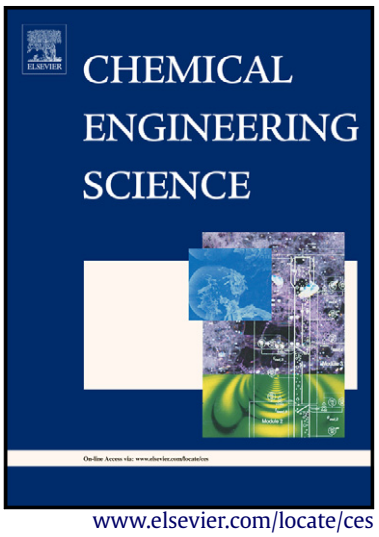

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Transient behavior of structured $LaMnO_3$ catalyst during methane combustion at high pressure

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ABSTRACT

In this work, the transient behavior of a perovskite-based monolith was investigated during catalytic combustion of methane at high pressure. The transient behavior of both a fully coated and a partially coated monolithic reactor was simulated. Numerical results have shown that the initial phase is mainly driven by heterogeneous reactions. The temperature increase due to the heat developed on the catalyst surface is responsible for the activation of the homogeneous reaction process that allows to get complete fuel consumption. The heat back-diffusion through the monolith walls is mainly responsible for the reaction front moving upstream. After anchoring of the reaction front at the monolith entrance, the dominant phenomenon is the warming up of the system that is ruled by the solid heat capacity. In the case of the partially coated reactor, ignition starts in the catalytic channels. Here, catalytic reactions activate homogeneous reactions. The heat generated is then transferred to the uncoated channels, thus allowing the on-set of homogeneous reactions and, consequently, the complete fuel consumption throughout the entire monolith.