

2C04: EXPERIMENTAL INVESTIGATION OF GASEOUS REACTIVE FLOWS AROUND CATALYTICALLY COATED MICRO-WIRES.

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Comment by Dirk Roekaerts, Delft University of Technology, The Netherlands
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You mentioned that using micro-wires to construct a fixed catalyst bed, a smaller length is needed compared to a standard honeycomb structure. Is this higher efficiency of micro-wires fully explained by your measurements on flow over a coated cylinder?

Reply by Dimitrios Kyritsis
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Indeed, we think it is. The flow expansion indicated by the results affects a significantly larger flow area than the one physically blocked by the wire. In this low-Re (and subsequently low-Pe) environment the “boundary layer” is very thick with respect to the wire and this facilitates preheating and conversion of the reactants. The vortices that are thus generated prolong the residence time in the vicinity of the wires. Moreover, in a “multi-wire” reactor, expansions from neighboring wires interact and generate a region of the flow that affects the reactant stream and is practically equal to the frontal area, although the physical blockage may be relatively small. This situation is much more favorable with respect to transport to the catalytic surface than diffusion through slowly developing boundary layers in classical monoliths.