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S. Sadjadi, U. Simon, H.R. Godini, O. Görke, R. Schomäcker, G. Wozny

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S. Sadjadi*[a], U. Simon[b], H. R. Godini [a], O. Görke[b], R. Schomäcker[c], G. Wozny [a]

[a] Technische Universität Berlin, Institute for Process Dynamics and Operation, Straße des 17. Juni 135, 10623 Berlin, Germany
email: s.sadjadi@mailbox.tu-berlin.de, Tel. 0049 (0) 30 314 29515
[b] Technische Universität Berlin, Institut für Werkstoffwissenschaften und –technologien, Fachgebiet Keramische Werkstoffe, Hardenbergstr. 40, 10623 Berlin, Germany
[c] Technische Universität Berlin, Institut für Chemie, Straße des 17 Juni, 10623 Berlin, Germany

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Oxidative coupling of methane (OCM) represents a process concept for conversion of methane as a major component of natural gas into chemical intermediates such as ethylene at high temperatures between 700-900 °C.

The objective of this work is to study the performance of two miniplant-scale fluidized-bed reactors made of FeCrAlloy and quartz glass, respectively, with same dimension (inner diameter of 56mm). The aim is to find the necessary reaction conditions for optimizing the C_2 yield of the process, and to study the effect of the reactor material in a larger scale. These findings are important for future industrial scale applications.

2.2%Na_2WO_4-2%Mn/SiO_2 catalyst, tested for this study, was prepared by incipient wetness impregnation method and 55 g of it was tested for each experiment in the reactor. The maximum C_2 yield achieved at low nitrogen dilution gas composition was 23% for the quartz glass reactor and 20% for the FeCrAlloy reactor at 830 °C. Due to the reactivity of the reactor wall in the metal reactor, the methane and oxygen conversion as well as the C_2 selectivity are influenced. However, the results were promising considering that the reactor scale under study is the largest tested for this catalyst so far. After 7 hours of stability testing, the catalyst in the quartz glass reactor exhibited stable performance and high mechanical stability.