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# Biogas reforming with CO2 using an innovative Catalyst based on local extruded clay monolith

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## Abstract

In the actual context of global warming there is an important need for innovation in technology solutions promoting low carbon emissions. Engineering of efficient catalysts exhibiting high performance at lower operating temperatures will help saving significant amounts of energy and reducing the carbon emissions. Special attention is devoted to the development of non-noble metal catalysts material taking advantage of the available minerals such as clays with respect to their physicochemical and textural properties suitable for applications in catalysis. In recent years, clays served successfully as catalysts due to their chemical composition consisting mainly of aluminosilicates that might act as catalyst support as well as mixtures of several common compounds such as $Fe_2O_3$, MgO, $K_2O$, usually considered as active phases and promoters contained in material available locally. Furthermore, we highlighted an innovative aspect associated with the easy extrusion of clays based catalyst and related advantages over conventional packed bed reactors allowing not only reducing pressure drop but also preventing hot spots/cool zones within the reactor. This is beneficial with respect to heat transfer in case of energy sensitive reactions such as methane reforming with $CO_2$. The latter represents an outstanding issue from an environmental and economic viewpoint contributing to the reduction of greenhouse gas through transformation to valuable chemicals and cleaner energy precursors. The catalytic behavior of methane reforming was successfully tuned due to the stabilization of smaller Ni particle sizes associated with the formation of NiO-MgO solid solution. The obtained results suggest different types of nickel-support interactions in addition to enhanced basic properties inducing synergy effects on the rate of methane and $CO_2$ conversion

### Recent Publications

1. Akri, M., Chafik, T., Granger, P., Ayrault, P., Batiot-Dupeyrat, C., 2016. Novel nickel promoted illite clay based catalyst for autothermal dry reforming of methane. Fuel.
2. Mohcin Akri, Stéphane Pronier, Tarik Chafik, Ouafae Achak, Pascal Granger, Pardis Simon, Martine Trentesaux, Catherine Batiot-Dupeyrat. Development of nickel supported La and Ce-natural illite clay for autothermal dry reforming of methane: Toward a better resistance to deactivation, Applied Catalysis B: Environmental, 205, 15 (2017) 519–531
3. Mohcin AKRI Ouafae ACHAK, Pascal GRANGER, Sheng WANG, Catherine BATIOT-DUPEYRAT and Tarik CHAFIK, Autothermal Reforming of Model purified Biogas Using an Extruded Honeycomb Monolith New Catalyst Based on Nickel Incorporated Illite Clay Promoted With MgO. Journal of Cleaner Production, 171 (2018) 377-389

### Biography

Tarik Chafik is currently full Professor, Research Director and Master courses coordinator at the Faculty of Sciences and Techniques of Tangier (Morocco), where he is teaching Thermodynamic, Chemical engineering, catalysis and atmospheric pollution control. He graduated from the University of Lyon than he was Post-doc researcher at University of Patras and he worked for 2 years at AIST, Tsukuba Japan. He was awarded as Fulbright visiting researcher at University California Berkeley (with Prof. A. T. Bell). Prof. T. Chafik's research is focused on sustainable development technologies such as those involving adsorbents and catalysts for VOC removal and methane reforming as well as nanomaterials for winds turbine lubricant additive and nanoporous carbon for energy storage. He is coordinator of several projects involving both academia and local companies, He published around 100 papers (h index 21 scopus)

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