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# Hydroxyapatite supported bimetallic cobalt and nickel catalysts for syngas production from dry reforming of methane

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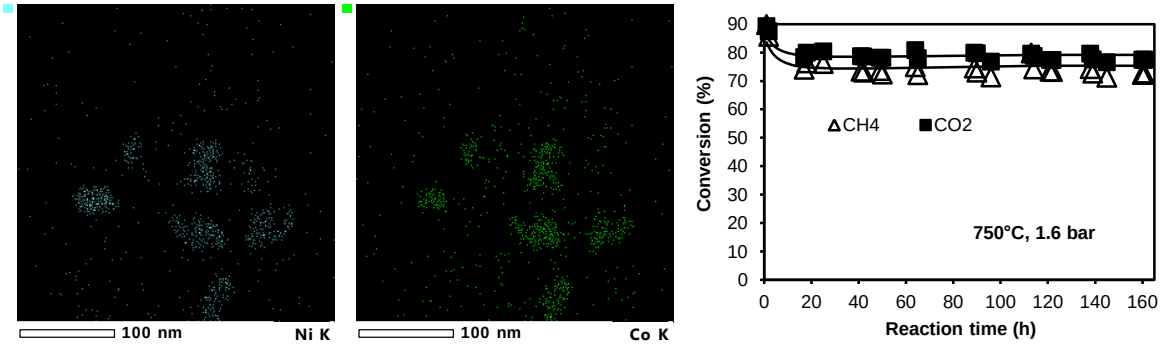
Graphical abstract




Highlights

- Ni-Co/HAP bimetallic catalysts were successfully prepared and tested in DRM reaction
- High catalytic performance was obtained at 700-750°C
- Carbon deposition under CNTs form at low content was observed
- Metals particle size only slightly changed after catalytic test

Abstract

Hydroxyapatite (HAP, $Ca_{10}(PO_4)_6(OH)_2$) has all the criteria of a catalyst support, in particular its high thermal stability. However it is still less studied in the heterogeneous catalysis. For the first time, hydroxyapatite supported bimetallic Co-Ni catalysts were prepared and evaluated in the dry reforming of methane (DRM) process. Nanoparticles containing both nickel and cobalt were well formed on the surface of HAP by conventional impregnation methods. No modification of HAP structure was observed after metals deposition. DRM reaction was carried out at 700-750°C and around 1.6 bar, using a fixed-bed reactor which was fed with a mixture of 20%vol $CH_4$, 20%vol $CO_2$ and 60%vol $N_2$. $CH_4$ and $CO_2$ conversion reached up to 60 and 68% at 700°C, respectively, and 73 and 79% at 750°C, respectively during long reaction times of 50-160 h. Water as a by-product could be quantified along the catalytic reaction indicating the implication of reverse water-gas-shift reaction. TEM-EDX analysis of the used catalysts recovered after catalytic tests showed that coke deposition was limited and there was slight modification of metals particle size. The results obtained were very promising for the design of an efficient catalytic system for DRM process.