

# High Coke-Resistance NiAl-MnY Catalyst for Dry Reforming of Methane

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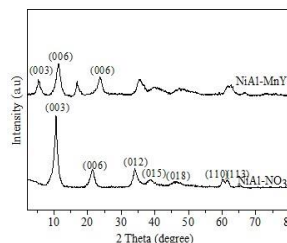
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**1. Introduction** – Dry Reforming of Methane (DRM,  $\text{CH}_4 + \text{CO}_2 \rightarrow 2\text{CO} + 2\text{H}_2$ ), is nowadays considered as a perspective alternative for the production of syngas ( $\text{H}_2 + \text{CO}$ ) involving the valorization of  $\text{CO}_2$ , coming either from capture or naturally present in the reactant gas, i.e. such in biogas. Furthermore, the  $\text{H}_2/\text{CO}$  molar ratio in DRM-syngas, equal to 1, makes it applicable for Fischer–Tropsch synthesis [1]. One of the main drawbacks confronted during the process of  $\text{CO}_2$  reforming of methane, is the poor stability of the catalyst over prolonged period of times, this is mainly associated with carbon deposited on the catalyst's Surface [2]. Several studies have been proposed to limit the formation of coke such as, the incorporation of the active phase in welldefined structures such as perovskites, hydrotalcites, etc., maybe on stream or (pre)reduction, resulting in a higher dispersion of the active phase species which leads to a good compromise between stability and catalytic activity. In this context, the purpose of the present work was to prepare efficient NiAl and NiAl-MnY catalyst driven form hydrotalcite for dry reforming of methane.



**2. Experimental** - The NiAl- $\text{NO}_3$  and NiAl-MnY (Y= ethylenediaminetetraacetic acid, EDTA) catalysts were prepared by co-precipitation method. The physico-chemical properties of the synthesized materials were characterized using various techniques such as TGA, ICP, XRD, BET, FTIR, TPR- $\text{H}_2$ , SEM-EDX, TEM, XPS and TPO- $\text{O}_2$ . After calcination and subsequent reduction at 700 °C for one hour, the materials were evaluated for their catalytic activity in the reaction of dry reforming of methane at 700 °C under continuous flow processing with  $\text{CH}_4/\text{CO}_2$  ratio equal to 1.

**3. Results and Discussion** - The hydrotalcite structures were confirmed using XRD analysis (Figure 1), while the intercalation of Mn in the interlayer space was verified using both XRD and FTIR.

**4. Conclusions** - NiAl-MnY catalyst exhibited high activity and selectivity, but also high stability and good resistance to carbon deposition; this could be related to the capacity of manganese oxide in oxidizing carbon deposition forming CO as by-product.

## 5. References

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