# High Performance Metal Based Hydrotalcite Catalytic Support for Nanotubes Growing

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## BACKGROUND

Uniform distribution and reliable adhesion of carbon nanotubes (CNT) to support is very important topic in catalytic applications. Amiagus has developed very effective and reliable technology for compositional metal/hydrotalcite support production, especially for nanotubes growing [1].

## EXPERIMENTAL

Hydrotalcite coating is thermally sprayed on steel support (honeycomb structure) produced from steel strip with thickness 30-40 μm (Fig.1A-B). The research of CNTs' growth has been carried out by chemical vapor deposition (CVD), under different conditions of temperature between 550 ºC and 650 ºC, using ethane as carbon source. This gas is fed into the reactor in changeable ratio of 25% and 100% of $C_2H_6$:$H_2$, over hydrotalcite type coating. After reaction, obtained sheets were characterized with SEM and TEM (Fig.1 B-F).

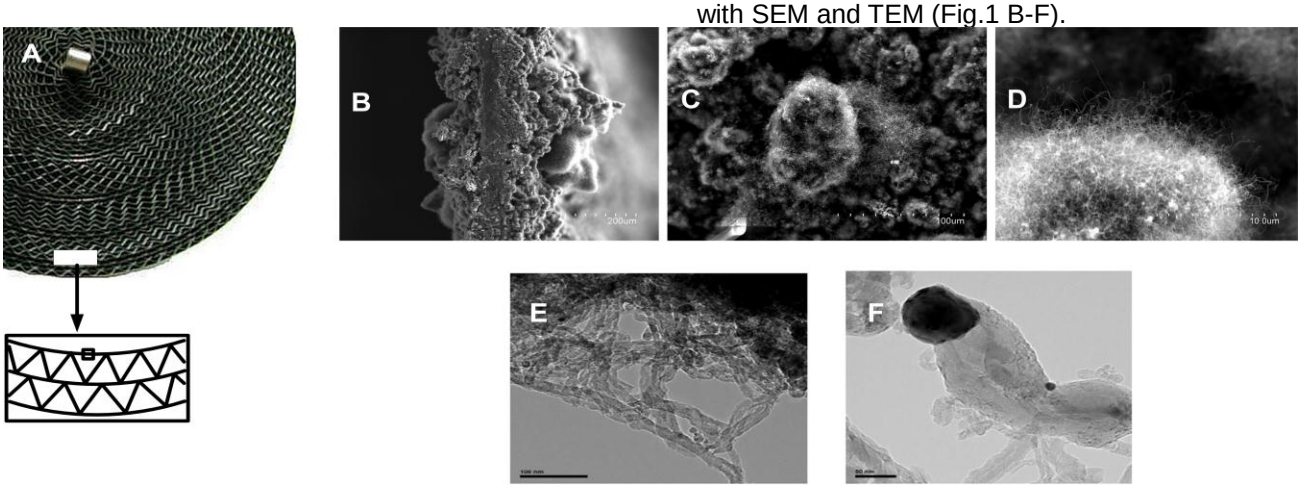


Fig. 1 Carbon nanotubes growth on metal/hydrotalcite support honeycomb structure containing block.

## DISCUSSION

Hydrotalcite coating after thermal treatment has microcrystalline structure of uniformly distributed oxides of metals, which were especially introduced into hydrotalcite structure during its synthesis (e.g. Ni, Co, Fe etc.) and appear ideal nucleation catalysts support for CNT growing. Initial structure of sprayed hydrotalcite can be partly changed (size of oxides, density of their distribution, type of porous structure) by annealing at different temperatures and adopted for optimal conditions of CNT growing.

Honeycomb (or other structure) with hydrotalcite coating can be produced in its final shape (different size of internal channels, additional perforation and etc. Fig.1A) and after annealing can undergo to chemical treatment for CNT growing. In case of need internal surfaces of the each honeycomb structure channels can be coated by different hydrotalcites. It gives additional opportunity to localize catalytic processes inside of channels [2].

Formed variable size CNTs using CVD method are shown in SEM and TEM images (Fig.1 C-F). It was also observed the different sizes of encapsulated nickel particles within the carbonaceous material. The results of adherence calculated as weight lost did not show considerable changes with the changes of temperature of synthesis. In addition, it was determined the weight of the CNT obtained, which considerably increased with raising $C_2H_6$:$H_2$ ratio and temperature of reaction. The works were performed as preliminary for **MONACAT** project devoted to water treatment.

## CONCLUSIONS

A real opportunity for CNTs growing on internal surfaces of metal based honeycomb structure with hydrotalcite coating is showed.

## REFERENCES

1. PCT/LT2006/000010
2. PCT/LT2004/00006