

# Flexible Alumina, Alumina-Magnesia, Zirconia and Carbon Mesoporous Catalytic Supports on Metal Foil Substrate

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## Introduction

The problem of catalyst adhesion to support is very important for most industrial applications. Amiagus has developed an original technology to produce flexible catalytic supports on the basis of alumina, alumina-magnesia and zirconia [1] on thin steel strip substrate.



## Properties of Catalyst Supports

- ✓ **High flexibility** - thin layer coatings (less than 10 μm) on both sides of steel strip – **total thickness 40-50 μm**;
- ✓ **High adhesion** – high resistance to **thermal cycling 500 °C – 20 °C with cooling in water** (Fig. 2);
- ✓ **Mesoporous structure** of support (**70-90% of total porosity**) and high enough specific surface area (Table 1);
- ✓ **Opportunity to introduce active elements (Ni, Co, Fe etc.) into support** and to get their uniform distribution as oxides;

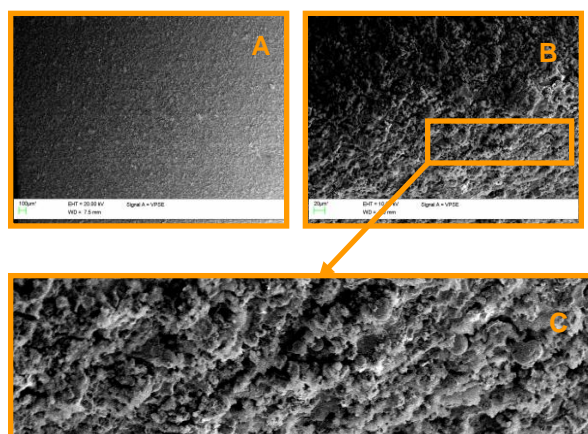


Fig.1. SEM pictures of full coating on the metal support (A), surface of corrugated and straighten strip (B-C).

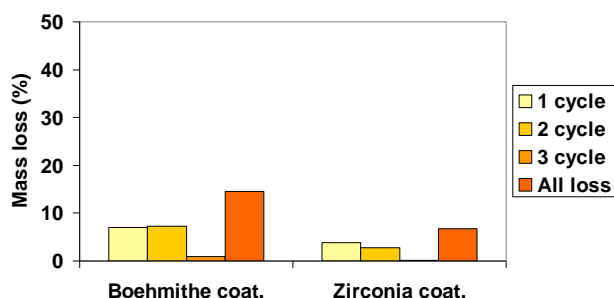


Fig. 2. Thermal cycling tests: calcinations at 500 °C then cooling in water.

Table 1. Specific surface analysis of coatings.

	Surface, [m <sup>2</sup> /g]				Volume, [mm <sup>3</sup> /g]		
	BET (coating)	Langmuir	Mes.	Micr.	Total	Mes.	Micr
A	54.5	74.4	26.4	6.8	47.9	35.2	2.4
B	67.9	93.0	58.8	0.0	65.3	58.3	0.0

## Discussion and Conclusions

Often catalytic supports deposited on metal substrate show a weak adhesion to metal and it can lead to a cracking, depletion and peeling of coating in hard conditions (thermal shock, thermal cycling, gas erosion etc.). **Amiagus technology guarantees high adhesion to metal substrate and this gives unique opportunity to make any machining (including cutting, corrugation, perforation etc.) without depletion or peeling of sprayed layer** (Fig. 1-2).

Other feature of technology, developed by Amiagus, is **very uniform mesoporous structure of catalytic support**. Maximum volume is achieved for mesopores with size of 1.5-10 nm, maximum surface area – for pores with size of 1.5-5 nm.

## Reference

- [1] Klemkaitė K., Khinsky A., Stephenson H., Bradshaw H., Zirconium based catalytic units for tars cracking, 14th International Congress on Catalysis, Book of Abstracts, Seoul, Korea (2008), P II-12-09