

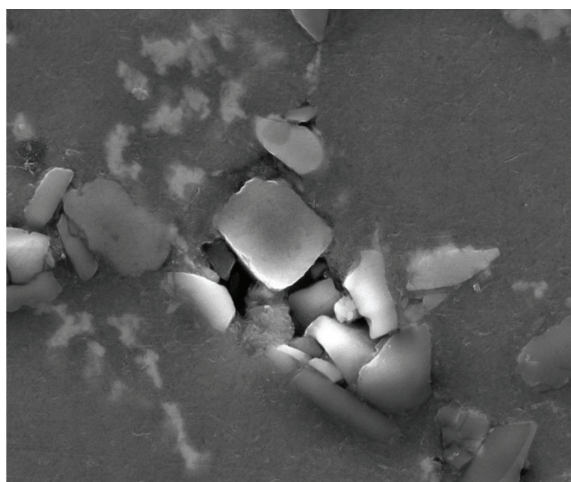
**Research centre** for Processing and Characterisation of Advanced Materials

**Goal of the project:**

The main purpose of the project is to develop a class of specific composites based on aluminum and nanoparticles of aluminum oxides. These advanced cermets preserve their properties at high temperatures and are wear resistant.

**Short description of the project:**

This project aims to obtain new materials and advanced technologies with large applicability and with rapid development of this field. The parts obtained using these materials are of high class, given by their technical and economical performances. They also contribute to the reduction of environment pollution by low emanation of heat and combustion gases in the atmosphere.



Typical digital image of a composite material, scanning electron microscopy, 5000x

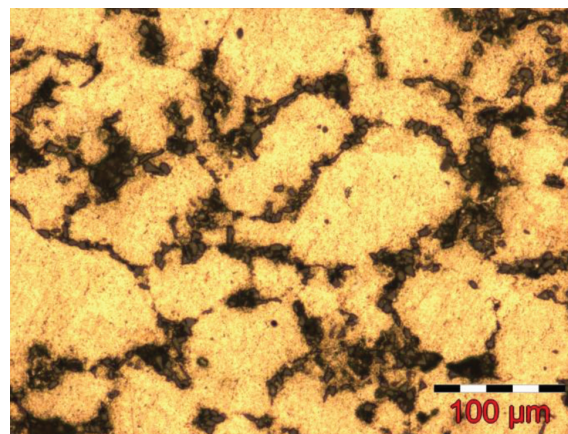
**Implementation period:** 2012-2015

**Project implemented by:**

SC ICPT TEHNOMAG CUG SA Cluj Napoca  
•coordinator of the project, Politehnica University of Timisoara, Department for Materials Engineering and Fabrication  
•Partner 1, SC TEHNOMAG SA Cluj Napoca  
•Partner 2 and SC TEHNOEXPERT SRL Cluj Napoca – Partner 3

**Main activities:**

For the first stage of the project, the main activities include the analysis on the intergrain phenomena that take place in the morphology of the pores during reactive sintering of the composites.



Digital image of a composite material with aluminum matrix, optical microscopy

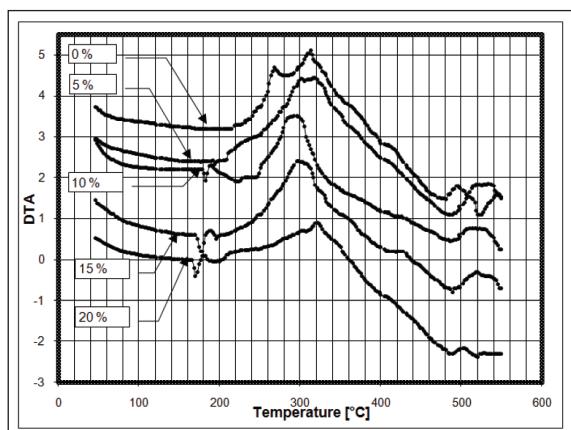
**Results:**

- Study of the intergrain phase transformation at reactive sintering
- Study regarding the computer processing of morphologic modifications of pores and structure at reactive sintering
- Computer modelling of the morphologic transformation by diffusion at sintering.

"At every level the greatest obstacle to transforming the world is that we lack the clarity and imagination to conceive that it could be different"

Roberto Unger

- Characterization of the cermets properties related to pores morphology and compounds resulting at reactive sintering



DTA curves at heating of Al-SiC cermet  
(%SiC = 0..20% vol.)

The main goal achieved during the first stage of the project was to emphasize the methods for control and analysis of the intergrain phenomena and pore modification during sintering of the Al-Al<sub>2</sub>O<sub>3</sub> cermets. The morphology of the pores (size, shape, characteristic dimensions, dimensional distribution) as well as the size and distribution of the compounds resulted after sintering were investigated by optical and scanning electronic microscopy (SEM).

The images obtained were afterwards computer processed to find all the details about this new class of materials.

A computer model of the morphologic transformations by diffusion at reactive sintering was also elaborated in this stage.

#### Fields of interest:

The main fields of interest connected with the project applicability and implementation

are: materials engineering, composite materials, environment protection.

#### Financed through/by:

UEFISCDI, PN II type project, Partnership in priority domains

#### Research team:

*UPT team:* Assoc. Prof. Dr. Eng. Mircea Nicoară, director of the project, Prof. Dr. Eng. Viorel-Aurel Șerban, Assoc. Prof. Dr. Eng. Aurel Răduță, Assist. dr. Cosmin Locovei, Assist. dr. eng. Carmen Opriș, Assist. Prof. Dr. Eng. Daniel Țunea, Assoc. Prof. Dr. Eng. Dănuț Șoșdean

*SC ICPT TEHNOMAG CUG SA:* Dr. eng. Gheorghe Tudor Șurdeanu - director

*SC TEHNOMAG CUG SA:*

Eng. Liviu Daianu – director

*SC TEHNOEXPERT SRL:*

Eng. Viorel Mureșan - director

#### Aplicability and transferability of the results:

The results obtained during the project will be transferred to companies in the field of automotive industry and will be presented on a web page accessible to all large public. Also, they will be presented during the AMS '13 *Advanced Materials and Structures* International Conference, a conference organized by the Department of Materials and Manufacturing Engineering from the Politehnica University of Timișoara.

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