

MICRO AND NANOSCALE DESIGN OF THERMALLY ACTUATING SYSTEMS – MIDAS

Goal of the project

A strong partnership has been organized to develop the research on shape memory alloys as materials for actuation, with well-known institutions, aiming to tackle a multitude of issues based on proven qualifications of the partners: powder metallurgy, severe plastic deformation, welding and joining, specific characterization techniques and development of applications.

Short description of the project

The Micro and Nanoscale Design of Thermally Actuating Systems – MIDAS was successful in joining research partners from four continents in the effort to develop actuating materials belonging to the shape memory alloy group.

Project implemented by

Project Coordinator: Politehnica University Timisoara, Romania (UPT)

EU Partners:

Universidade Nova de Lisboa, Portugal (FFCT)
 Universitat de les Illes Balears, Spain (UIB)
 Cranfield University, UK (CU)
 Laboratório Nacional de Energia e Geologia, Portugal (LNEG)

Partners outside EU:

Universidade Federal Fluminense, Brazil (UFF)
 University of Waterloo, Canada (WU)
 Indian Institute of Science, India (IISc)
 Russian Academy of Sciences (RAS)
 University of Science and Technology Beijing, China (USTB)

Implementation period

1.01.2014–31.12.2017

Main activities

- WP 1 – MA Structural optimization by Mechanical Alloying
- Coordinating unit: LNEG; Partners: FFCT, UFF, UPT, USTB
- WP2 – SPD Phase control by Severe Plastic Deformation
- Coordinating unit: FFCT, IISc, UFF, RAS, USTB
- WP3 – CHR Micro and nanoscale characterization
- Coordinating unit: UIB, Partners: FFCT, UPT, LNEG, UFF, IISc, RAS, USTB
- WP4 – WJ Welding and joining techniques
- Coordinating unit: CU; Partners: WU, UPT, FFCT
- WP5 – (AD) Applicative design for smart materials integration
- Coordinating unit: UPT; Partners: RAS, LNEG, Nova.id, IME

Results

Achievements: Materials processed via mechanical alloying technology ; Optimized technology based on experimental loops; Processed materials using SPD techniques; Microstructural maps of manufactured alloys and structures; Phase transformation parameters for the alloys and structures; Joints made out of shape memory alloys with similar and dissimilar compositions; Technological paths for different joining techniques used; joint applications for funding; prototypes; patent applications

Transfer of knowledge: Structural control by; X-Ray Diffraction; Electron microscopy (SEM, TEM) and specific sample preparation; Phase transitions (DSC, XRD, internal friction, optical microscopy); Ultrasonic, friction and electric welding; Powder metallurgy technology; Laser; Advanced design of SMA; Application development; Mechanical Testing.

Details: <http://midas.nanophys.ru/>

Applicability and transferability of the results:

The MIDAS Project has a very high relevance for ERA because it connects through research and training important actors from Europe in the development of advanced materials at micro and nanoscale manufactured via various techniques extremely qualified partners from the world.. The partnership developed encourages collaborations in the benefit of all the partners who are themselves involved in strengthening ERA via their current activities. By the training offered in the institutions an increase of the attractiveness highly qualified people develop interesting subjects of research and could contribute to the expansion our educational interest in other countries. The MIDAS Project is in full consonance with the interest of the doctoral schools of the partners, it is expected to provide significant skills needed to develop activities in the micro and nanoengineering fields, thus increasing their chances to get a high-tech job and contribute to the development of the region.

Further opportunities to develop lasting collaboration identified during the collaboration, such as:

- Recruitment of early stage researchers for postdoctoral stages that would expand their knowledge in partners institutions.
- Identification of new patentable ideas based on the expertise of the partners.
- Stimulation of cultural interest and evaluation of opportunities to expand the institutional collaboration to other groups involved in other fields of research.

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Research Centre

Department of Materials and Manufacturing Engineering

Research team

Prof. Corneliu M. CRACIUNESCU
Assoc. Prof. Adelina HAN
M.Sc. Eng. Roxana SPRINCENATU
M. Sc. Eng. Andrei NOVAC
Eng. Mircea NICOLAESCU

Contact information (Ex)

Prof. dr. ing. habil Corneliu Marius CRACIUNESCU
Faculty of Mechanical Engineering /
Department Materials and Manufacturing Engineering
Address: Bd. Mihai Viteazul, No. 1, Postal Code 3000026, Timisoara
Phone: (+40) 256 403 655
Mobile: not provided or paid by the university
E-mail: corneliu.craciunescu@upt.ro
Web: <http://midas.nanophys.ru/>