Project report 2020

TATAMI

Thermal AcTuation and energy hArvesting using MultIphysic alloys

MAIN PARTICIPANTS

				
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OVERVIEW *(keep within this page)*

Starting year: 2020 **Current researchers** (permanent/non-permanent): 3 person-month/year

Positioning *(Multiple selection allowed – total 100%)*	**Transportation**	**Energy**	**Eng. for Health**
Materials and structure design		20%	
Surfaces and interfaces		50%	
Simulation and modeling		30%	

Other:

Include partner from ☐ Outside ELyT ☐ Industry

Main funding source(s)
☒ Public project(s) ☐ Industrial ☐ Own resources

IFS CRP/LyC project? ☒ Yes ☐ No

For main projects: Agency / year / name of project *(up to 3, past projects in gray)*
- IFS LyC, 2020-2021, Collaborative Research Project
- JSPS, 2019-2020, invitational fellowship

Estimated annual budget: 10 k€

Highlights & Outstanding achievements *(3-5 bullet points)*

- Materials with thermomagnetic properties are considered
- Applications in the field of energy harvesting and actuation are developed
- A microgripper demonstrator driven by thermoelectric modules (heating/cooling) has been fabricated
- JSPS invitational and post-doc fellowships granted (10+13 months)

Illustration *(5x5 cm² max)*

PROJECT DESCRIPTION

Background (10 lines max; Calibri 11)

TATAMI project aims at providing alternatives to thermoelectric modules for thermal to electrical energy conversion and to conventional SMA and magnetic devices for actuation. To this end, the project consists in the development of structures using magnetothermal coupling. TATAMI proposes innovative routes for thermo-mechano-electrical and electro-thermo-mechanical energy conversion systems. The project will propose designing systems in the framework of energy harvesting and actuation. Specifically, TATAMI aims at an innovative global approach driven by "material and device by design" philosophy. The general outcomes of TATAMI encompass material and systems aspects, through theoretical and experimental investigations, with the development of innovative small-scale demonstrators.

Key scientific question (2 lines max; Calibri 11)

How to efficiently convert electrical energy in mechanical energy and conversely.
What is the globally optimized energy conversion chain.

Research method (8 lines max; Calibri 11)

Benefiting from the excellent knowledge and complementarities of the partners and using as basis such previous collaborations, TATAMI aims at going beyond current results.
To achieve the project's goals, a global and interconnected approach, driven by the "material and system by design", is proposed, declined into tightly interacting work packages as follow:

- WP1 - material selection, fabrication and optimization
- WP2 - modeling and characterization
- WP3 - energy harvesting device
- WP4 - actuation system

Research students involved *(gray color for previous years)*

Ph.D. candidates (years, institution):

-

Master/Bachelor students (years):

-

Visits and stays *(gray color for previous years)*

FR to JP (date, duration):

- M. Lallart (Sept. 2019-July 2020, 10 months)
- L. Yan (Sept. 2019-Sept. 2020, 13 months)

JP to FR (date, duration):

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COMMUNICATIONS AND VALORIZATION

Journal publications *(gray color for previous years)*

	Authors	Title	Journal	Vol.	pp. / ID	Year	DOI
1	M. Lallart, H. Miki, L. Yan, Linjuan, G. Diguet, M. Ohtsuka	Investigation of Low Field Response of Metamagnetic Heusler Alloys as MultiPhysic Memory Alloys	J. Phys. D: Appl. Phys.	53	345002	2020	https://dx.doi.org/10.1088/1361-6463/ab8c7c
2							

Conferences *(gray color for previous years)*

	Authors	Title	Conference	Date	City	Country	DOI *(if applicable)*
1	M. Lallart, H. Miki, L. Yan, G. Diguet, M. Ohtsuka and G. Sebald	Low-Field Modeling of Heusler MultiPhysic Memory Alloys	The 17th International Conference on Flow Dynamics (ICFD2020)	October 28 - 30, 2020	Sendai	Japan (online)	
2							

Patents *(gray color for previous years)*

	Inventors	Title	PCT #	Year
1				
2				

Others *(gray color for previous years)*

	People	Event	Description	Date
1				
2				