

DELIVERABLE D5.3

DISSEMINATION AND ACADEMY-INDUSTRY DAY REPORT
AND PLANNING, 1ST PERIOD

Work package	Related tasks	Dissemination level	Document nature	Estimated delivery date	Status
WP5	T5.3	Public	Report	30/10/2018	submitted

Editor	Contributing partners	Reviewers
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**MEMO – Mechanics with molecules**

MEMO has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 766864.



DOCUMENT HISTORY

Version	Date	Author/editor	Description
0.1	16/10/2018	Katharina Amsel (TUD)	First version
0.2	23/10/2018	Francesca Moresco (TUD)	Completed version
0.3	25/10/2018	Francesca Moresco (TUD)	Including comments C.J.
1.0	30/10/2018	Katharina Amsel (TUD)	Tables included

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EXECUTIVE SUMMARY

MEMO aims to communicate and disseminate the project results within the scientific and industrial community as widely as possible and also to a large public via the NanoCar Race. This report summarizes the dissemination activities in the first twelve months of the project and provides a plan for these activities during the remaining 36 months of project (M13 – M48).

1. DISSEMINATION STRATEGY

GENERAL PRINCIPLES

Dissemination and communication are key activities for the success of the MEMO project. The work package 5 manages the corresponding activities. All consortium partners are aware of and committed to ensure good dissemination and communication of the results during and after the course of the project to achieve its sustainable impact. The MEMO consortium is committed to an active dissemination strategy of the project's aims and outcomes, following the principles of **Open Science**.

TARGET GROUPS

MEMO strives for a **target-group tailored communication**. A stakeholder analysis has identified the following target audiences for dissemination activities:

- Industry (such as clock industry, microelectronics industries, spatial industries, energy provider's large companies, as well as many high-tech SMEs)
- Scientific community (especially in the research fields of surface science, chemical synthesis, nanoscience)
- Students (project will be presented to students during regular lectures and during invited guest lectures at high schools and symposia)
- General public (via, for example, the nanocar race)

DISSEMINATION TOOLS

To maximize the outreach of the project and to allow for a target group specific communication, MEMO makes use of a mix of different communication tools:

- Project website
- Press releases
- Science-to-public initiatives ("Dresden Science Night", science fairs, and diverse local Open Day)
- Scientific publications
- Contributions at international conferences
- Organization of scientific workshops
- Academy-Industry Days
- International molecule car race
- Publication of the project on Research Gate



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2. IMPLEMENTATION OF DISSEMINATION ACTIVITIES

PROJECT IDENTITY

MEMO has its own corporate design, which includes the abbreviation MEMO, a logo, dedicated colours and fonts. Templates are available for PowerPoint presentations, meeting and project documentation etc. These are consistently used by all partners for external communication activities. CI compliant slides for presenting the MEMO project outside the consortium have been developed and are available for all consortium members.



Figure 1. Logo for the MEMO project

PROJECT WEBSITE & SOCIAL MEDIA

To **target a broad audience** MEMO has set up a **website** that contains information about the project progress (cf. D5.1). The MEMO website can be accessed through the following link: www.memo-project.eu. A QR code (Quick Response) leading to the MEMO website is included in all printed communication of MEMO.



Figure 2. QR Code for the MEMO website

MEMO website contains a general part describing the goal of the project and the participating groups. Publications and other dissemination events are reported as well on the webpage. Particularly the 2nd NanoCar Race is advertised and accompanied on the MEMO website.

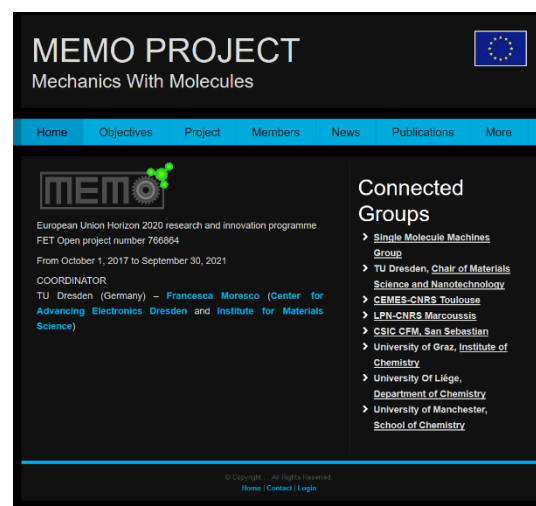


Figure 3. Screenshot of the MEMO website



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PRESS RELEASES AND OTHER NON-SCIENTIFIC PUBLICATIONS

Press releases were issued by TUD and CNRS at the occasion of the kick-off meeting in November 2017 as well as the opening of registration for the NanoCar Race II.

After the publication of the Nanocar Race II press release, the EU commission published the news on its webpage (<https://ec.europa.eu/digital-single-market/en/news/nanocar-race-ii-preregistration-now-open>) and several local newspapers in Dresden contacted the MEMO coordinator and published articles for the general public (see for example <http://www.dnn.de/Dresden/Lokales/Dresdner-Physiker-richten-das-Nanocar-Race-mit-Molekularautos-aus>, <https://oiger.de/2018/03/05/raserei-in-der-nanowelt/167067>, and a few other printed journals available on request). In Japan, the Nano Car Race registration was published online by MANA (http://www.nims.go.jp/mana/news_room/news/2018030501.html) while in France CEMES-CNRS reported the opening of the preregistration in its online news (<http://www.cemes.fr/Nanocar-Race-II>). The French journal L'actualité Chimique also published the announcement (L'actualité Chimique n°427-428 p. 121).

Table 1. List of MEMO published and planned non-scientific publications (*planned publications in italics*)

Institution	Type of Activity	Short Description (Relevance for MEMO)	related WP	Date	
TUD	Press release	New EU FET open Project: MEMO Kick-off Meeting on November 2-3, 2017	WP5	11/2017	M02
TUD	Press release	Nanocar Race II Pre-registration is Open	WP5	03/2018	M06
TUD	Non-scientific and non-peer-reviewed publication (popularised publication)	Dresdner Neueste Nachrichten: Dresdner Physiker richten das „Nanocar Race“ mit Molekularautos aus	WP5	03/2018	M06
TUD	Non-scientific and non-peer-reviewed publication (popularised publication)	Oiger: Raserei in der Nanowelt; Dresdner Physiker richten „Nanocar Race II“ mit Molekularautos aus	WP5	03/2018	M06
CNRS	Press release	Nanocar Race II Pre-registration is Open	WP5	03/2018	M06
CNRS	Non-scientific and non-peer-reviewed publication (popularised publication)	L'actualité Chimique (no. 427-428, p. 121): Lancement de la NanoCar Race II	WP5	03/2018	M06
CNRS	<i>Communication Campaign (e.g. Radio, TV)</i>	<i>Broadcast of NanoCar Race II</i>	WP5	<i>ttbc</i>	<i>M33-48</i>



Contacts Downloads Impressum



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cfaed - News

NEWS

New EU FET Open Project: MEMO Kick-off Meeting on November 2-3, 2017
Published on Fri, 17 Nov 2017 in NEWS



EVENTS

DISTINGUISHED LECTURE SERIES
Currently there are no events.

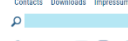
SEMINAR SERIES
Currently there are no events.

UPCOMING EVENTS

17 to 27 October 2018
VISIONMAT - Containerausstellung zu den Arbeitswelten der Zukunft - Station 3
24 to 25 October 2018



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cfaed - Public Relations - Press Releases

PRESS RELEASES

Nanocar Race II Pre-registration is Open
PRESS RELEASE 5 MARCH 2018
Published on Mon, 05 Mar 2018 in PRESS RELEASES



EVENTS

DISTINGUISHED LECTURE SERIES
Currently there are no events.

SEMINAR SERIES
Currently there are no events.

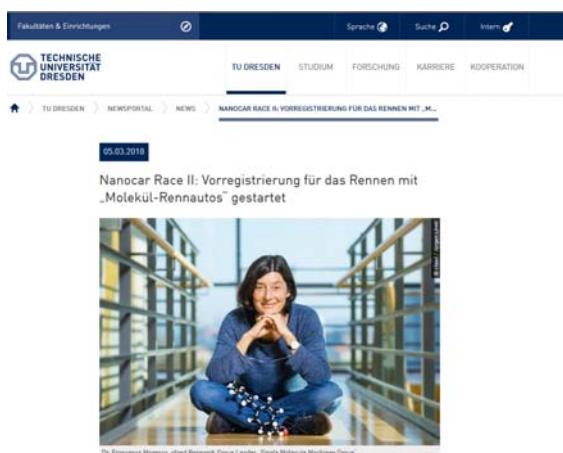
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Chimie et société

Lancement de la NanoCar Race II

En avril 2017, la NanoCar Race, organisée au CEMES-CNRS à Toulouse et remportée par l'équipe suisse, avait vu s'affronter quatre équipes internationales propulsant leurs molécule-voitures de quelques centaines d'atomes grâce à des impulsions électriques sur une piste constituée par les sillons de la reconstruction d'une surface d'or définie à l'atome près⁽¹⁾. Le projet européen FET Open (pour « Technologies futures et émergentes ») MEMO (« Mechanics with molecules »), lancé en octobre dernier⁽²⁾ va rééditer l'expérience **en 2021** en organisant une seconde édition de cette aventure scientifique sur le même site avec de nouveaux véhicules.

- **Date limite des préinscriptions : 30 juin 2018.**

- Pour en savoir plus et préinscriptions :

<https://memo-project.eu/flatCMS/index.php/Nanocar-Race-II>

(1) Joachim C. et al., La NanoCar Race, première course internationale de molécule-voitures, *L'Act. Chim.*, **2016**, 411, p. 1.

(2) <https://memo-project.eu>

Figure 4. Screenshots of the MEMO press releases

SCIENTIFIC PUBLICATIONS

The results of MEMO are published in high-ranked, peer-reviewed scientific journals. When deciding for a journal and/or conference for publication of project ideas and results, the MEMO consortium will take into consideration reputation and quality (peer review, impact factor) but also offered open access options. However, it might not always be possible to publish the golden way, i.e. publishing immediately in open access mode via a peer-reviewed Open Access Journal as not all top-tier conferences and journals offer such an option. In these cases, we will use green open access that host most of the top-tier journals of interest in our research domain. Publishing the green way means archiving and depositing of the published article or final peer-reviewed manuscript by the author in an online repository before, alongside or after its publication, depending on the publishers' Open Access policies. The consortium decided to utilize institutional and subject based Open Access Repositories where available. For example, TUD can make use of the document and publication server Qucosa, which is a service of the Saxon State and University Library (SLUB) at Dresden (<http://www.qucosa.de>). If no institutional repository is available, the deposit service of OpenAIRE (<http://www.openaire.eu>) will be used to find a possible repository for publication.

In addition, proceedings of two MEMO International Workshops will be published in the Springer book series "Advances in Atom and Single Molecule Machines" created by P2-Toulouse in 2012 with 11 volumes already published (<http://www.springer.com/series/10425>). More than 5000 chapters in average were loaded per volume since 2014. Building on this attractiveness will boost the impact on single molecule mechanical machinery.



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Table 2. List of MEMO published and planned scientific publications (*planned publications in italics*)

Institution	Journal: Title	Type of Publication	Date of Publication	
CNRS	European Journal of Organic Chemistry: Expedient Synthesis of Thioether-Functionalized Hydrotris(indazolyl)borate as an Anchoring Platform for Rotary Molecular Machines	Article in Journal	06/2018	M09
CSIC	Chemical Communications: On-surface synthesis of heptacene on Ag(001) from brominated and non-brominated tetrahydroheptacene precursors	Article in Journal	08/2018	M11
GRAZ	Angewandte Chemie International Edition: Reversible Photoswitching and Isomer-Dependent Diffusion of Single Azobenzene Tetramers on a Metal Surface	Article in Journal	09/2018	M12
CNRS	Nanotechnology: Surface manipulation of a curved polycyclic aromatic hydrocarbon-based nano-vehicle molecule equipped with triptycene wheels	Article in Journal	09/2018	M12
TUD	<i>Chemical Physics: Time-dependent framework for energy and charge currents in nanoscale systems</i>	<i>Article in Journal</i>	<i>10/2018</i>	<i>M13</i>
TUD	<i>Current-induced molecular rotation in open quantum system: a rotational Anderson-Holstein model</i>	<i>Article in Journal</i>	<i>tbc</i>	<i>tbc</i>
TUD	<i>Surface Science: Inducing the controlled rotation of single o-MeO-DMBI molecules anchored on Au(111)</i>	<i>Article in Journal</i>	<i>tbc</i>	<i>tbc</i>

CONFERENCES, WORKSHOPS AND OTHER EVENTS

MEMO will organize at least **two scientific workshops** to present recent research results and contribute to the formation of a new generation of scientists, with the participation of external scientists and industrial partners. The proceeding of those workshops will be published in the Springer book series "Advances in Atom and Single Molecule Machines"(cf. 2.3). The first workshop with the title "**Building and Probing Small**" will be organised by LIEGE. It will take place on March 25-27 2019 in the prestigious rooms and gallery of the Palace of the Academies in Brussels. The symposium will concern the design and synthesis of molecular machines and

functional molecules, as well as their characterisation by single-molecule force spectroscopy techniques. It will include invited plenary lectures, keynote lectures, short communications selected from submitted abstracts and a poster session. Five plenary speakers and 11 keynote speakers have already confirmed their participation.



Figure 5. Homepage of the MEMO Workshop "Building and Probing Small".



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In addition, **participation in conferences, symposia and workshops** is also a significant part of the project's work. Whenever possible, the MEMO project accepts invitations to present posters or give talks in addition to accepted research papers and at exhibition booths. In this way, contact to the worldwide community and dissemination of results is ensured. A corporate project presentation has been prepared and is regularly updated to facilitate and foster manifold project presentation.

The participation of **science-to-public initiatives** is currently planned for 2019 and 2020. Particularly the "Dresden Science Night" – attracting up to 40.000 visitors per year – represents a major dissemination opportunity directed not only towards the general public, but also towards politicians and scientists (particularly of different disciplines). The next "Dresden Science Night" will take place 14 June 2019 (www.wissenschaftsnacht-dresden.de/).

Table 3. Dissemination events with MEMO contribution (*planned events in italics*)

Institution	Type of Activity	Short Description (Relevance for MEMO)	related WP	Date	
CNRS	Participation to a Conference	5th Int. symposium on new frontiers in materials science, Sapporo, Japan STM : a fantastic tool to control mechanical nanomachines : Nanovehicles and molecular motors (invited lecture)	WP1 and WP2	11/2017	M02
CNRS	Participation to a Conference	International symposium on chirality in soft matter, Nagoya, Japan The role of chirality to obtain unidirectional rotating molecular motors (invited lecture)	WP1 and WP2	11/2017	M02
CNRS	Participation to a Conference	Zheng Guan Cun Forum on Condensed Matter Physics, Institut of Physics, Chinese Academy of Science Beijing, 23 Nov. 2017 (China) The Nanocar race (Invited Conference)	WP5	11/2017	M02
CNRS	Participation to a Conference	International Symposium : "Nanomachines: Powering molecules" Hong Kong Baptist University, One way rotation of a single molecule-rotor (Invited lecture)	WP3	11/2017	M02
CNRS	Participation to a Conference	International conference on natural and artificial molecular machines, Bombay, India, Molecular rotors and motors based on coordination and organometallic complexes (invited lecture)	WP1 and WP2	12/2017	M03
CNRS	Participation to a Conference	New Frontiers of Supramolecular Chemistry in Non-equilibrium Systems, Yokohama Japan, The role of chirality in unidirectional rotating molecular motors (invited lecture)	WP1 and WP2	01/2018	M04
CNRS	Participation to a Conference	International Symposium : "Nanomachines: Powering molecules" Hong Kong Baptist University, The Nanocar Race (Invited lecture)	WP5	11/2017	M06
CNRS	Participation to a Conference	Conference to the Appl. Physics Department, Waseda University, Tokyo. The Nanocar Race, (invited Lecture)	WP5	03/2018	M06
TUD	Participation to a Conference	DPG Spring Meeting of the Condensed Matter Section (SKM) together with the EPS/ TU Berlin/Title: Rotational dynamics of model molecular gears: non-equilibrium Green's function approach	WP2/WP4	03/2018	M06
TUD	Participation to a Workshop	oral presentation at DPG Spring Meeting of the Condensed Matter Section (SKM) together with the EPS/ TU Berlin/Title: Unimolecular NAND logic gate with input by single Au atoms	WP1	03/2018	M06
TUD	Participation to a Conference	oral presentation at DPG Spring Meeting of the Condensed Matter Section (SKM) together with the EPS/ TU Berlin/Title: On-surface synthesis of nitrogen-doped 5-7-membered nanographenes	WP1	03/2018	M06
CNRS	Participation to a Conference	CFAED Seminar TU Dresden , Quantum and Classical Motion for molecule-motor (invited lecture)	WP3	04/2018	M07
CNRS	Participation to a Conference	MANA-NIMS symposium Quantum or classical motion for a molecular motor (keynote lecture)	WP3	06/2018	M09
CNRS	Participation to a Conference	43rd International Conference in Coordination Chemistry, Sendai, Japan Synchronized rotation of a network of Eu(III) molecular rotors (invited lecture)	WP1 and WP2	08/2018	M11
CNRS	Participation to a Conference	The 79th Okazaki Conference "Synthetic, biological and hybrid molecular engines", Okazaki Japan, Biomimetic and technomimetic molecules : Molecular wheels, nanovehicles, rotors and motors (keynote lecture)	WP1 and WP2	08/2018	M11
TUD	Organisation of a Workshop	1st MEMO Academy-Industry Day	WP5	08/2018	M11
TUD	Participation to a Conference	oral presentation at the On-Surface Synthesis Workshop/Sant Feliu de Guixols, Spain/ Title: On-surface synthesis of non-alternant polyaromatic hydrocarbons	WP2	09/2018	M12
TUD	Participation to a Workshop	invited talk at the On-Surface Synthesis Workshop/Sant Feliu de Guixols, Spain/ Title: Functional molecules synthesized on-surface: wires, logic gates, and gears	WP1-WP2	09/2018	M12



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LIEGE	Organisation of a Workshop	1st MEMO Workshop (Brussels): "Building and Probing Small"	WP5	03/2019	M18
TUD	Exhibition	Dresden Science Night	WP5	06/2019	M21
TUD	Exhibition	Dresden Science Night	WP5	tbc	M33
TUD	Organisation of a Workshop	2nd MEMO Academy-Industry Day	WP5	tbc	tbc

SECOND INTERNATIONAL NANOCAR RACE

In 2021 the European FET OPEN project MEMO will organize the 2nd International Nanocar Race (Nanocar Race II). P2.1-Toulouse started in the first period of the MEMO project already to organize Nanocar Race II. An international organizing committee was first nominated, with members from MEMO and outside MEMO to cover all the possible interested continents. The composition of the international organizing committee is the following:

- F. Moresco (MEMO & LT-UHV)
- A.S. Duwez (MEMO & ambient)
- C. Joachim (MEMO & Europe) Nanocar Race II Director
- S.W.Hla from Ohio University (America)
- K. Ariga from NIMS-Tsukuba (Japan)
- H. Gao from Chinese Academy of Science (Asia)

Nanocar Race II has also received the explicit patronage of Pr. J.P. Sauvage, 2016 Nobel Prize in Chemistry.

On the 13 February 2018, MEMO officially contacted the Federation Internationale de l'Automobile (FiA) to seek for their support in diffusing the Nanocar race II to a very large public, and to be associated to the event in 2021. The JAF (Japanese Automobile Federation) was contacted officially by a Japanese team a bit earlier on the 30 January 2018 for the same purpose (letter available on demand). On the 1 March 2018, the first answer from the General Secretary of the FiA in Paris was very positive, but later, during months of discussion, the feedback of the FiA became step by step more critical. After the exchange of many emails (available on demand), and a few phone calls in particular with the FiA Technical Director in Geneva, a short email was issued on the

MEMO PROJECT
Mechanics With Molecules

Home Objectives Project Publications **Nanocar Race II** More

Nanocar Race II - Preregistration

In 2021 the European FET OPEN project MEMO (Mechanics with Molecules) is organizing the 2nd international Nanocar Race (Nanocar Race II). All teams will compete at the same time in a remote controlled mode from Toulouse and will meet at the Toulouse CEMES-CNRS G. Dupouy campus (France) in 2021 for about a week for training and then to nanorace via the public network. The competition will be live broadcasted.

Connected Groups

- Center for Advancing Electronics Dresden (cfaed), [Single Molecule Machines Group](#)
- TU Dresden, [Chair of Materials Science and Nanotechnology](#)
- [CEMES-CNRS Toulouse](#)
- [LPN-CNRS Marcoussis](#)

28 May 2018 by the FiA Technical Director, indicating that FiA will not support Nanocar race II because too far from the FiA technical concerns. On the 16 June 2018, MEMO wrote an official letter to FiA asking for more detailed explanations (available on demand). MEMO is still waiting for an answer to this letter. MEMO Nanocar Race II Director is now trying to organize an official meeting in Paris with the FiA General Director to clarify the case.

Figure 6. Screenshots of Preregistration for NanoCar Race II in 2019



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In parallel to that and also in February 2018, a first call was published and diffused to the laboratories which may be interested by Nanocar Race II around the planet. We asked them to fill-up a pre-registration form available on <https://memo-project.eu/flatCMS/index.php/Nanocar-Race-II>. By March-April 2018, MEMO received a first positive signal from 25 potential teams. At the end of June 2018 and at the pre-registration deadline, MEMO had received 13 official pre-registration forms. As published on the MEMO website and after analyzing in detail each pre-registration form, the organizing committee of Nanocar Race II had decided to accept all those 13 pre-registrations. In some cases, however, the organizing committee had asked for more detailed information necessary to complete their pre-registration. An acceptance letter with specific comments was sent to each of the teams on the 22 September, 2018. The teams have now time until January 2019 to answer and complete the pre-registration. Until now, four teams have already answered. Then, each team will have two years to improve its molecular design and to train itself on its own LT-UHV single tip STM on Au(111).

Nanocar Race II (Spring 2021)

Summary of the officially pre-registered teams (10 October 2018)

	LT UHV	Surface	Financial Support	Molecule structure	Nb. Atoms	Remote Control	STM Driver	Short team Name	NCR1
Spain (San Sebastian)	OK	Au(111)	Yes	Almost Dipolar Inelastic	About 60	OK	Yes	?	21/09/18
Spain (Madrid)	OK	Au(111)	Yes	Yes Dipolar	>60	OK	Yes	?	21/09/18
Germany (Dresden)	OK Createc	Au(111)	Yes	Yes Dipolar Inelastic	>100	OK	Yes	GAZE	21/09/18
China (Suzhou)	No STM	?	Yes	Yes V. pulse	>100	OK	No	WING	21/09/18
China (Nanchang)	OK Createc	Au(111) Cu(100) ?	Yes	? Light	?	OK	Yes	?	22/09/18
USA (Ohio)	OK	Au(111)	Yes	Yes Dipolar	>100	OK	Yes	Ohio Bobcat Nanodrag.	22/09/18
USA-Austria (Rice-Graz)	OK Createc	OK	OK	Yes Dipolar	OK	OK	Yes	?	22/09/18
Czech Republic (Prague)	? UHV	Au(111)	Yes	? Light driving	?	OK	?	UCT Nanorobots	22/09/18
Canada (Montreal)	Specs UHV LN2	Au(111)	?	?	?	?	Yes	?	22/09/18
France-Japan (Toulouse-Nara)	OK	Au(111)	OK	Yes Dipolar	>100	OK	OK	Toulouse Nara	22/09/18 answer 24/09/18
France (Strasbourg)	?	Au(111)	Yes	?	?	OK	?	?	22/09/18
France (Marseille)	OK Closed cycle	Au(111) Ag(111)	Yes	Yes Dipolar	<50	OK	Yes	?	22/09/18
Japan (Tsukuba)	OK Unisoko	Au(111) Ag(111)	Yes	Yes V. pulse	>100	OK	Yes	MANA Tsukuba Drift	22/09/18

For the final online registration in 2019, each selected Nanocar Race team will have to provide to the organizing committee by January 2020 the following information:

1. The molecular structure of the molecule-vehicle engaged in the race (xyz file).



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2. STM/AFM image of the molecule-vehicle on selected surfaces for ambient or LT-UHV.
3. Demonstration that its molecule-vehicle is drivable with no mechanical push.
4. The definitive list of its sponsors (private, public).
5. The anticipated name of the pilots which will be in Toulouse for the Nanocar Race II.

In 2020, a member of the organization committee will visit each team to get a detail knowledge of their preparation level and of the remote control protocol to be used.

Table 5. NanoCar Race II Timeline (*future activities in italics*)

Activities	Result	Project month
Re-registration	Interest to participate declared	M5-M9
Organisation Committee Meeting	Teams authorized to compete selected	M12
<i>Final registration</i>	<i>Detailed information collected from selected teams</i>	<i>M16 – M28</i>
<i>NanoCar Race II Preparation</i>	<i>Design consolidated by selected teams</i>	<i>M28 – M42</i>
<i>Committee visit to the team</i>	<i>Detailed knowledge of preparation level and of the remote control protocol to be used acquired</i>	<i>M28 – M39</i>
<i>NanoCar Race II</i>	<i>One-week training for selected teams followed by NanoCar Race II via the public network carried out; final ranking defined</i>	<i>M43-48</i>

ACADEMY-INDUSTRY DAYS

To establish bilateral links with the European industry is a declared goal of MEMO project. While the project participants are coming from the academic community, and the MEMO goals are mainly of fundamental scientific relevance, MEMO is actively looking for a productive collaboration with the industry organizing regular meetings (Academy-Industry Days) with interested industrials. These meetings allow to involve for example the clock industries, the microelectronics industries, the spatial industries, the energy providers' large companies, as well as many high-tech SMEs in the MEMO progresses and to promote industrial dissemination.

The first Academy-Industry Day took place on then the 31 August 2018 (M11) in Dresden at the QF Hotel, Neumarkt 1. The list of participants comprised particularly representatives from clock industry. A declaration of confidentiality was signed by the participants in order to freely discuss the activities of MEMO and the specific interests of the participating companies and institutions.

In Fig. 8 the program of the Academy-Industry day is reported. The slides of the presentations have been shared between the participants. In the first part of the meeting, Francesca Moresco (MEMO coordinator, P1-Dresden) and Christian Joachim (P2.1-Toulouse) presented the idea and the goals of the MEMO project, with special attention to the miniaturization of mechanical calculating machines. After that, contributions from the clock industry showed the close vicinity between the development of clocks and of mechanical calculators, as well as the interest of collaborations especially from the representative of TagHauer. A German SME working in Nano-indentation (ASMEC) presented its activities, which are strongly related to the applications for MEMS trasducers at the Fraunhofer Institutes in Dresden. In particular, the activities of the Fraunhofer Institute IKTS in nanoanalysis and nanomechanics, and the working group nanomechanics of the Dresden centre for nano-



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analysis represents at the local scale of Saxony an important vehicle for the dissemination of the MEMO activities to the industry and applied science community. The first MEMO Academy-Industry day was closed by a fascinating talk of Prof Ina Prinz, director of the *Arithmeum* in Bonn, Germany, who presented an historical overview on the development of mechanical calculating machines.

During the following round table, the participants discussed under the coordination of Christian Joachim important questions like:

- The future of mechanical calculators and clocks
- Mechanics for energy storage and memory (immunity to radiations)
- Nano-friction
- Application of mechanics for input/output of data in electronic devices



MEMO INDUSTRY DAY August 30, 2018

THURSDAY 30 AUGUST 2018	
TIME	PROGRAM
9:00	F. Moresco, TU Dresden
9:20	C. Joachim, CNRS Toulouse
10:00	<i>Coffee break</i>
10:30	Lutz Reichel, NOMOS
11:10	Thomas Mercier, TAG Hauer
11:50	Bert Kaiser, Fraunhofer IPMS
12:30	<i>Lunch</i>

THURSDAY 30 AUGUST 2018	
TIME	PROGRAM
14:00	André Clausner, Fraunhofer IKT
14:30	Thomas Chudoba, ASMEC
15:00	Dominique Mally, CNRS Qrsay
15:30	Michael Kleinwächter, CEMES-CNRS Toulouse
16:00	<i>Coffee break</i>
16:30	I. Prinz, Arithmeum Bonn
17:00	Round Table Discussion
19:00	<i>Conference dinner</i>

The discussion was continued during the dinner at the restaurant Alter Meister. After the meeting, all participants provided their presentation and manifested the interest of keeping contacts with the MEMO project. T2.1-Toulouse, in particular, is further discussing the details of the next generation of miniaturized mechanical machines with Thomas Mercier from TagHauer. The CAD design of a miniature calculator was provided by P2.1 Toulouse to Thomas Mercier for further improvement and eventually for planar fabrication using the TagHauer machine tools. In Fig. 9 some pictures of the day are presented.

Figure 8. Program of the first Academy-Industry day.



MEMO – Mechanics with molecules

MEMO has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 766864.



Figure 9. Impressions of the first MEMO Academy-Industry day

The second Academy-Industry Day is planned for the next project period and will probably take place in France in 2019. Its organization will be discussed during the next project Meeting in Brussels on December 3-4, 2018.



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