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Project Full Title:	Functional surface treatments using ultra-short pulse laser system
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SCIENTIFIC DISSEMINATION PLAN

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FEMTOSURF Consortium

PHOTONICS PUBLIC PRIVATE PARTNERSHIP

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[1] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/glossary

[2] Kirsti Ala-Mutka, European Commission, H2020 Common Support Centre/J5, "Dissemination and Exploitation in Horizon 2020"

Participant No	Participant organization name	Country
1 (Coordinator)	Femtika	Lithuania
2 Partner	Amphos	Denmark
3 Partner	FORTH	Greece
4 Partner	SUPSI	Switzerland
5 Partner	ROLLA	Switzerland
6 Partner	Aerea	Italy
7 Partner	MTC	United Kingdom
8 Partner	Heliotis	Switzerland
9 Partner	Ramteid	Germany

Authors List

Leading Author (Editor)			
Surname	**First Name**	**Beneficiary**	**Contact email**
Grigaleviciute	Giedre	Femtika	giedre@femtika.lt

Reviewers List

List of Reviewers (in alphabetic order)			
Surname	**First Name**	**Beneficiary**	**Contact email**
Nemickas	Gedvinas	Femtika	gedvinas@femtika.lt

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Contents

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1. Introduction

The main objective of FemtoSurf project is to develop, test and demonstrate industrial-grade solid-state 2-3 kW-level fs laser with parameters suitable for metal surface patterning applicable in industrial settings. FemtoSurf industrial-grade 2-3kW-level fs laser will be integrated in propose-built optical chain enabling multi-beam processing (100+ simultaneous beams) with individually tailored spatial distributions in each laser spot, integrated into a fully automated processing setup for efficient patterning arbitrary shaped metal components with sizes exceeding several meters while retaining micrometre level precision and on-the-fly quality assessment (zero faulty parts delivered).

Project description

Creating 3D patterns on surfaces changes their properties and the way they interact with other materials. Ultrafast lasers are proving particularly promising in this realm. Surface features on scales from nanometer to millimeter sizes can be controlled to fine-tune functionality and performance in numerous applications from aerospace to biomedicine with particular interest in wettability, attraction and repelling. The FemtoSurf project has a bold idea for these tiny patterns. The project partners are developing the technology to enable the simultaneous several beams of ultrafast laser beam for surface patterning. When integrated into an automated industrial setup, the system will enable patterning at the micrometer scale in components exceeding several meters in length. This technology will open the door to exciting possibilities to optimize aerodynamics in large structures such as planes, ships and implants.

The document scopes

The present document the Scientific Dissemination Plan for the FemtoSurf project (Grant Agreement No.: 825512), funded by the European Union's Horizon 2020 Research and Innovation programme (H2020).

It aims to draw an overview both theoretical and practical about the strategy to disseminate results, and to share them between the broad society and among the stakeholders and the scientific community specifically.

Results are described as "any tangible or intangible output of the action" (they include data, knowledge, networks, information, processes, products, services, etc.), "as well as any attached rights, including intellectual property rights"[1].

Beyond the H2020 requirements new approaches regarding the socialization of science have been taken into account in this plan in order to maximize the social impact of science (SIS) since Responsible Research and Innovation (RRI) claims "from science in society to science for society, with society" (Owen, R. et al, 2012).

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Therefore, we consider communication not just as a mere tool. We are not only focusing on an instrumental point of view but also on a constitutive conception of communication which integrates dissemination as well as exploitation objectives, activities, resources, media, monitoring and engagement with private and public stakeholders involved in the project.

2. General Principles

2.1. Communication

Regarding the European Commission description, communication is "strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at promoting the action and its results. It requires strategic and targeted measures for communicating about (i) the action and (ii) its results to a multitude of audiences, including the media and the public and possibly engaging in a two-way exchange"[1].

For the beneficiaries, communicating their action and its results is an integral part of the H2020 Grant Agreement (Article 38.1.1). They "must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public), in a strategic and effective manner and possibly engaging in a two-way exchange." [1]

The purpose of the communication activities is to make the research activities known to multiple audiences (in a way that they can be understood by non-specialists) and the activities must address the public policy perspective of EU research and innovation funding, by considering aspects such as (i) transnational cooperation in a European consortium (i.e. how working together has allowed to achieve more than otherwise possible) or (ii) scientific excellence or (iii) contributing to competitiveness and to solving societal challenges.[1]

2.2. Dissemination

Dissemination is a specific term for the H2020 programme and it means "to make the results of a project public (— by any appropriate means other than protecting or exploiting them, e.g. scientific publications)"[1]. Dissemination activities are important because it transfer the knowledge and results to the ones that can best make use of it; maximizes the impact of research, enabling the value of results to be potentially wider that the original focus. [2]

Dissemination is described as an essential element of all good research practice, it prevents results becoming sticky and effectively lost and it strengthens and promotes the profile of the organization. [2]

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2.3. Difference between communication and dissemination

Table 1 shows the difference between communication and dissemination activities[2]:

	Communication	Dissemination
What is it about?	Project and results	Results only
What is target audience?	Multiple audiences – beyond the project's own community (include the media and the public)	Audiences that may use the results in their own work e.g. peers (scientific or the project's own community), industry and other commercial actors, professional organisations, policymakers
What is the aim?	To inform and reach out to society, to show the benefits of research	To enable use and uptake of results
What is it based on?	Grant Agreement art. 38.1	Grant Agreement art. 29

Information and results sharing ways that can be used for communication and dissemination activities[2]:

Informing about project	Newsletter; press release; project factsheet, brochures; social media
Informing about results	Project website; videos, interviews; articles in magazines; exhibitions/open days/ guided visits; conference presentation
Making results available for use	Scientific publication; policy brief/roadmap; training/ workshops/ demonstration; sharing results on online repository

2.4. Exploitation

Exploitation is also a specific term for the H2020 Programme. It means "to make use of the results produced in an EU project in further activities (other than those covered by the project, e.g. in other research activities; in developing, creating and marketing a product, process or service; in standardization activities)"[1].

The aim of exploitation is to make use of the results and to concretize the value and impact of the R&I activity for societal challenges. [2]

2.5. Difference between dissemination and exploitation

Table 2 shows the difference between dissemination and exploitation activities[2]:

	Dissemination	Exploitation
What is it about?	Describing and making available results so that they can be used	Making use of results for scientific, societal or economic purposes

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What is target audience?	Audiences that may make use of results	Groups and entities that are making concrete use of results
What kind of project results are used?	All results which are not restricted due to the protection of intellectual property, security rules or legitimate interests	All results generated during project – participant shall make best efforts to exploit the results it owns, or to have them exploited by another legal entity
What is it based on?	Grant Agreement Art. 29	Grant Agreement Art. 28

Main ways how dissemination and exploitation activities can be used[2]:

Making results available	Scientific publication; policy brief/roadmap; training/workshops demonstration; sharing results on online repository
Facilitating further use of results	Innovation management; copyright management; data management plan; active stakeholder/user engagement
Making use of results	Patent; PhD thesis/ product post; further research; societal activity; open/ copyleft licenses; policy change

3. Impact

A complete range of activities has been set up to ensure the optimal visibility of the project and its results, increasing the likelihood of commercialization of the developed FemtoSurf solution and market uptake of knowledge produced in the project. Dissemination and demonstration activities are critical for the successful exploitation of research and innovation project results. The project mainly targets tool manufacturing, aerospace, maritime, and medicine industries and all partners are committed to maximize the potential impact of the outputs in terms of its dissemination to relevant stakeholders, including industry experts, research organizations, policy stakeholders and the general public. Partner commitment can be seen through WP9, which is dedicated entirely to communication and dissemination activities meant to promote the project and distribute its results among the stakeholders.

4. Dissemination activities

FemtoSurf dissemination strategy will be structured as described below in the following points:

- Ensuring the FemtoSurf awareness across scientific and industrial communities, particularly reaching to FemtoSurf technology end users, industrial players;
- Creating the European best practice in ultra-shot laser system 1 kW and above;
- Promoting the FemtoSurf approach for advanced education and training.

4.1. Ensuring the FemtoSurf awareness across scientific and industrial communities

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Non-confidential FemtoSurf knowledge and findings will be periodically diffused over time by means of traditional communication channels, in order to create a constant and continuous information flow towards the potential market:

- FemtoSurf website, press releases, media access, and periodical newsletters, targeting a wide range of interested stakeholders, from major sector actors to clustering European institutions such as Photonics21 and Additive Manufacturing European Platform.
- FemtoSurf publications on International conferences such as: Manufacturing and Technology Conference – SUR/FIN; The International conference on Surfaces, Coatings and Interfaces – SurfCoat Korea 2019; International Conference on Surface Engineering and Coating Technologies – ICSECT; International Conference on Superhydrophobicity and Superhydrophobic Surfaces – ICSSS; The International Conference on Metallurgical Coatings and Thin Films – ICMCTF.
- Publication in International Journals such as: CIRP Annals of Manufacturing Technologies; CIRP Journal of Manufacturing Science and Technologies, IEEE Transactions on Industrial Electronics; IEEE Transactions on Industrial Informatics; Journal of Intelligent Manufacturing; Computation Intelligence; Journal of Advanced Computational Intelligence and Intelligent Informatics.
- Trade fairs and exhibitions such as: International trade fair for surface treatment, electroplating and coatings - SF EXPO Chongqing; International Trade fair for surface Treatments & Coatings – O&S Expo; European Trade Fair on Surface Treatment Techniques - EUROFINISH 2019; International exhibition and conference for surface technology – ASTEC; European Coatings Show.
- Focused Events such as European Commission workshops, summit and info days.

4.2. Creation of resource efficient laser-based processes and machinery

The research and industrial worlds related to the sector of laser-based manufacturing may deeply benefit of the development of best practice fast material processing at the end of the project.

We consider important to generate the following results to be disseminated:

- The FemtoSurf handbook for designing and managing FemtoSurf technology. This book would concern the overall FemtoSurf approach for configuring and controlling industrial-grade kW-level fs ultra-short laser.
- Short books on success stories related to the specific FemtoSurf demonstrators, outlining the main features of the specific analysed sectors, the solution requirements and the description of non-confidential information about the single demonstrators and the related benefits once officially integrated in the steady state production.
- A demo version of the FemtoSurf Toolbox associated to the related user manual.

4.3. Promote the FemtoSurf approach for advanced education and training

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The FemtoSurf consortium will also organize short education and training courses for two specific purposes:

- Workshops for young researchers and PhD students to diffuse the scientific and research activities and practices related to FemtoSurf project.
- Industrial training for promoting new standards, approaches and tools to be adopted in for FemtoSurf solution set-up, installation and maintenance.
- The following outcomes are expected as the result of the dissemination activities:
- Industrial providers of hardware and software solutions in FemtoSurf will benefit of the project experience to provide a new generation of smart, compact, customized and reconfigurable solutions for the customers, improving their market share.
- Industrial users in FemtoSurf will apply the short and long-term benefits of FemtoSurf in their business, making them the model examples of the best practices developed within the project.

4.4. Dissemination - summary

Demonstrations to end users	6 Number of demonstrations in countries such as Germany, Switzerland, United Kingdom and France for potential end users.
Publications to ensure the FemtoSurf awareness across scientific and industrial communities	2 number of publications on the project outcomes in relevant academic journals. 10 number of presentations on International conferences.
Press releases	30 press releases, publications and showcases in media through the duration of the project.
Advanced education and individual trainings to promote the FemtoSurf approach and to contribute to the digitalisation of European industry	At least 5 trainings held for researchers, engineers and potential end user engineers. At least 15 people trained.
Participation in Conferences and Fairs	Participation in at least 10 number of relevant conferences.

Project results will be further disseminated through dissemination materials, publications and media presence. Dissemination materials will include short videos and brochures about the project as well as an online demonstrator demonstrating the concept of FemtoSurf. Meanwhile publications will include press releases, regular project updates from partners and publications in online journals. Additionally, project partner responsible for dissemination will be active in social media (Twitter, Facebook, Linkedin) targeting the selected focus group of professionals. FemtoSurf consortium will perform a set of actions that will ensure efficient dissemination of the project's activities and results at a European and international dimension. Dissemination and communication of the project go hand in hand. In addition to project communication activities and channels, each partner shall use its own dissemination networks to further publicise the project and to ensure maximum visibility and impact at a regional, national and EU level. Dissemination and exploitation will be coordinated by Femtika and where

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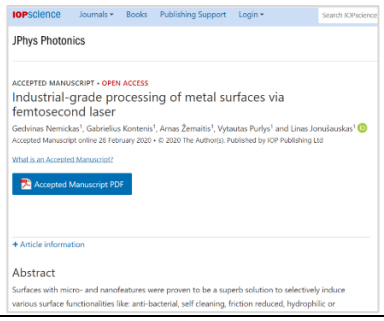
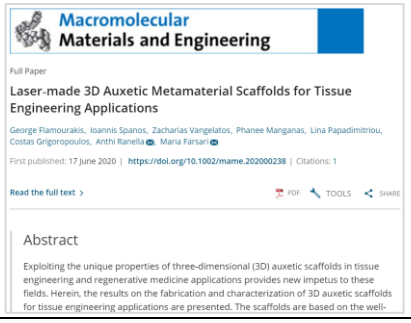
needed will purchase the service of experienced communication and dissemination service provider. The coordinator will maintain a schedule of the dissemination activities that will be undertaken by the consortium and will promote within the consortium specific actions that should be targeted by several participants. The dissemination strategy, achievements and plans will be delivered in specific reports.

Overall, dissemination activities will be concentrated on:

- Developing dissemination channels (project website, websites of other project partners, establishing in social media platforms like Twitter).
- Developing dissemination materials (short videos, project brochures).
- Organizing workshops and attending EU/international conferences.
- Publications and media presence (scientific publications, press releases, showcases in media).

5. Dissemination work undertaken

In the table below, the dissemination activities that have already been undertaken during months 1-18, will be described.

Goal	Achievement
2 publications in academic journals	• G. Nemickas *et al*, Industrial-grade processing of metal surfaces via femtosecond laser, JPhys Photonics 2 041004 (2020) • G. Flamourakis *et al*, Laser-made 3D Auxetic Metamaterial Scaffolds for Tissue Engineering Applications, Macromolecular Materials and Engineering 305(7), (2020)  IOPscience Journals Books Publishing Support Login JPhys Photonics ACCEPTED MANUSCRIPT • OPEN ACCESS Industrial-grade processing of metal surfaces via femtosecond laser Abstract  Macromolecular Materials and Engineering Full Paper Laser-made 3D Auxetic Metamaterial Scaffolds for Tissue Engineering Applications Abstract
10 presentations on international conferences	1. EPIC (European Photonics Industry Consortium) members Meeting on Surface Structuring at Laser World of Photonics. Munich, Germany, 6/27/2019. 2. The European Commission, Photonics 21 and LASHARE forum on "Intelligent Laser-Based Manufacturing in Europe" at the Laser World of Photonics. Munich, Germany, 6/27/2019. 3. EPIC Meeting on High Power Laser Systems at PBF. Amelo, The Netherlands, 10/10/2019. 4. Baltic Photonics Conference. Vilnius, Lithuania, 10/10/2019. 5. Photonics West 2020, Laser-based Micro- and Nanoprocessing XIV, Session 6. San Francisco, USA, 2/4/2020. 6. SPIE LASE, 2020, San Francisco, USA, 2/4/2020 - 2/6/2020.

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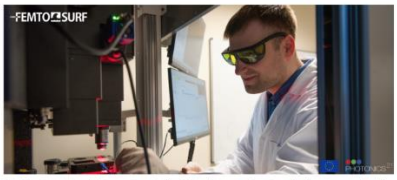
	7. EPIC Online Technology Meeting on Surface Structuring, 4/27/2020 (Femtika). 8. EPIC Online Technology Meeting on Surface Structuring, 4/27/2020 (Ramteid). 9. Smart Materials and Surfaces, Lisbon, Portugal, 10/1/2019. 10. MNE, Rhodes, Greece, 9/1/2019. 11. IC4N, Corfu, Greece, 7/1/2019. 12. International Society for Optics and Photonics, 2020 13. International Society for Optics and Photonics, 2021 14. The European Conference on Lasers and Electro-Optics (1) 15. The European Conference on Lasers and Electro-Optics (2) 16. XXXIV-SSM Panhellenic Conference on Solid State Physics & Materials Science, Patras Greece, 11-14 September 2019. 17. 12th FORTH RETREAT 2019, Patras Greece, 15-16 October 2019. 18. e.Micronora online event, 9/24/2020.    
30 press releases, publications and showcases in media	1. Press release in The Manufacturer: Changing a face of the metals – femtosecond lasers for industry 4.0, November 20, 2020.   2. 10 publications and showcases in media, including LinkedIn and Youtube.

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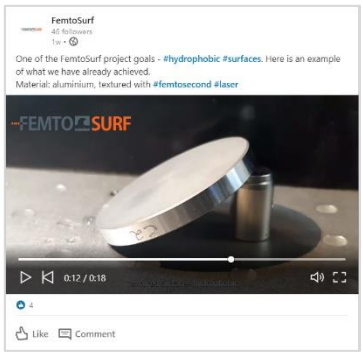
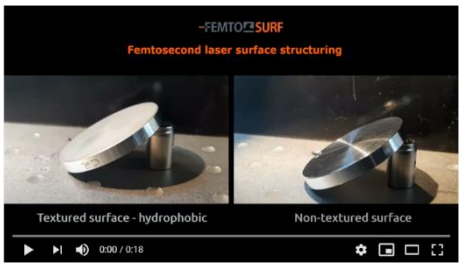
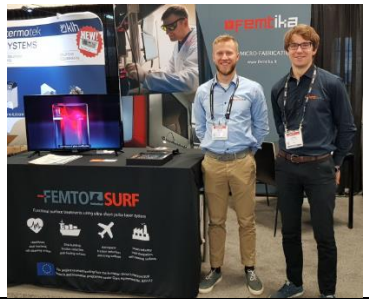
	   FemtoSurf - hydrophobic surface (femtosecond laser micro-structuring) 
10 conferences and fairs	Booths in the international trade fairs: 1. Photonics West 2020 exhibition, San Francisco, USA, 2020/02/04 - 2020/02/06. 2. LPM online event, 2020 22-26 June. 3. The MedTech Conference and Exhibition, 5-7 October 2020.  
At least 5 trainings held for researchers, engineers and potential end user engineers. At least 15 people trained.	1. Online training for the researcher from Straumann group.  2. Training for the professor of the Vilnius Gediminas technical university (Lithuania, by Femtika). 3. Online training for the Laser Zentrum Hannover researcher (Germany, by Femtika). 4. Training for the Swisstec3D AG researcher (Switzerland, by Heliotis). 5. Training for the company Lasea researcher (Switzerland, by Heliotis).

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6. Reporting

To facilitate an accurate monitoring and assessment of the communication, dissemination and exploitation activities, and to understand the impact of the actions carried out, it is necessary for all partners to register the activities that they implement. In this sense, there will be available in the private area of FemtoSurf server a section to report every communication, dissemination, exploitation activity or publication (articles, publications on blog, etc.) made by each consortium member.

These activities include both the previewed and the ad-hoc activities.

- All partners must take into account the communication, dissemination and exploitation procedures settle in this document.
- All partners should register the activities in the communication reporting document available in the FemtoSurf area.
- All partners should save evidence of the activities conducted.

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