Dissemination of project results

Activities carried out

At European level, an online meeting was held with the officers, i.e., dissemination ERANET Photonic Sensing on 4 November u.s. where the project was presented by AIT's Dr. Jacub Dostalek, along with other ERANET projects. The project was very positively evaluated. Presentations are shared at the Photonic Sensing website. In addition, and the possibility of intervening at a European dissemination event, in presence, coinciding with the Photonics21 event, possibly in April 20222 (to be confirmed).

Dissemination activities within the PLABAN project, although planned more intense in the second half of the project, have been put on an important brake due to the pandemic. In fact, in-presence events have been abolished and for the organization of events remotely it has been necessary to adapt to the new platforms that has not, in fact, allowed the desired activities and interactions with stakeholders. However, some results have already been disseminated at international conferences and seminars. The role of the Tuscany Region, the European Commission and the Photonic Sensing initiative has been recognised in all relevant circumstances. CHEMFI coordinated the dissemination activities, which involved all the Tuscan partners according to their respective resources. The dissemination activity, therefore, is to be referred to the consultation of the project website (number of accesses to the page in question is 23, 110 and 114 respectively for 2021, 2020 and 2019) and to publications in sector journals and oral communications at congresses. Given the difficulties in attending in presence in the last 15 months, it has not been possible to organize professional events. We consider in the future the possible production of videos in *PODCASTS, YOUTUBE,* on the activities of the project, currently not available. The coordination saw bilateral and choral telematic meetings with partners for the discussion of results and the design of experiments.

The project site has been updated recently.

Tools/equipment

Gmeet platform for meetings dedicated to the e-mail project for the exchange of information and reports.

Reports to conferences:

1. F. Ratto, "Hybrid devices exploiting the photothermal and photoacoustic features of plasmonic systems", African Materials Research Society 2019, Arusha, Tanzania, 10-13/12/2019 (keynote)
2. F. Ratto, "A bionic construct to target the tumor microenvironment with a plasmonic contrast agent", INO annual symposium 2019, Sixth Florentine, Italy, 3-5/4/2019
3. F. Ratto, "Cellular vehiculation to target the tumor microenvironment with gold nanorods", Nanodelivery 2019 London, UK, 18-20/3/2019
4. F. Ratto, "New opportunities at the crossroads of photoacoustics and plasmonics", Optics Within Life Sciences 2018, Perth, WA, Australia, 25-28/11/2018
5. F. Ratto, "Integration of plasmonic particles into multifunctional devices", Saratov Fall Meeting 2018, Saratov, Russia, 24-29/9/2018
6. F. Ratto, "Integration of plasmonic particles into multifunctional devices", Universidad Nacional Autnoma de México, Oct 29 2018, Mexico City, Mexico, 29/10/2018
7. Other oral contributions:
8. F. Ratto, G. Frigenti, L. Cavigli, G. Nunzi Conti, A. Fernandez-Bienes, S. Centi, A. Barucci, R. Pini, T. Garcia-Fernandez, S. Soria, "Design of an all-optical photoacoustic platform based on a microcavity resonator," SPIE Photonics West, San Francisco, CA
9. F. Ratto, S. Soria-Huguet, L. Cavigli, G. Frigenti, F. Micheletti, A. Fernandez-Bienes, S. Centi, T. Garcia-Fernandez, R. Pini, "Design of an all-optical photoacoustic platform for the inspection of plasmonic particles", Plasmonica 2018, Florence, Italy, 4-6/7/2018

10. F. Ratto, S. Soria-Huguet, L. Cavigli, G. Frigenti, F. Micheletti, A. Fernandez-Bienes, S. Centi, T. Garcia-Fernandez, R. Pini, "Alternative models of photoacoustic applications", Fotonica 2018, Lecce, Italy, 23-25/5/2018
11. S. Centi, C. Borri, P. Bogani, S. Scarano, M. Minunni, R. Pini, F. Ratto, Design of a paper-based platform for the detection of DNA/proteins with plasmonic particles. Photonics & Electromagnetics Research Symposium (PIERS), Rome, 17-20/06/2019.
12. S. Centi, C. Borri, P. Bogani, S. Scarano, M. Minunni, R. Pini, F. Ratto, Paper-based platforms for the detection of proteins/DNA with plasmonic particles. SPIE Photonics Europe Digital Forum 2020, 6-10 April 2020.
13. Jakub Dostalek, Stefan Fossati, Simone Hageneder, Nestor Gisbert Quilis, Daria Kotlarek, Priyamvada Venugopalan,Simone Auer, Sven , Klees, Niklas Jung, Ulrich Jonas, Materials Research Meeting 2019, Hybrid Nanomaterials for Plasmon-Enhanced Fluorescence Spectroscopy Biosensors, December 10-14, 2019, Yokohama, Japan (invited talk)
14. J. Dostalek, Surface plasmon resonance versus surface plasmon-enhanced fluorescence for label-free biosensors, PIERS, Rome, Italy June 17th – 21st 2019 (invited talk).
15. J. Dostalek, Plasmonic light management for fluorescence-based biosensors, PIERS, Rome, Italy, June 17th – 21st 2019 (invited talk).
16. N. G. Quilis, D. Kotlarek, S. Fossati, S. Hageneder, C. Petri, U. Jonas, J. Dostalek, Plasmonically enhanced fluorescence biosensors actuated by responsive hydrogels, OSA Advanced Photonics Congress, July 2nd-5th 2018, Zurich, Switzerland (invited talk).
17. J. Dostalek, Plasmonic affinity biosensors for sensitive biomarker detection, 15th International Life Sciences Meeting, April 18th - 19th 2018, Krems, Austria (invited talk).
18. Stefan Fossati, Simone Hageneder, Marianne Hiltunen and Jakub Dostalek,Plasmon-enhanced fluorescence on mass-produced biosensor chips, Molecular Plasmonics, May 23rd-26th 2019, Jena, Germany (poster).
19. N. G. Quilis, D. Kotlarek, S. Fossati, S. Hageneder, C. Petri, U. Jonas, J. Dostalek, Plasmonically enhanced fluorescence biosensors actuated by responsive hydrogels, Nano and Photonics, February 20th - 22nd, 2019 Mauterndorf, Austria (talk).
20. S. Fossati, D. Kotlarek, S. Hageneder, C. Petri, U. Jonas, J. Dostalek, Plasmonic nanohole arrays with thermo-responsive hydrogel cushion – towards flow-through biosensor, Nano and Photonics, February 20th - 22nd 2019, Mauterndorf, Austria (poster).
21. S. Hageneder, S. Fossati, M. Hiltunen, J. Hiltunen, J. Dostalek, Improving detection limits using plasmon-enhanced fluorescence biochips suitable for scaled-up production, Nano and Photonics, February 20th - 22nd 2019, Mauterndorf, Austria (poster).
22. S. Fossati, S. Hageneder, N. Sanchez, D. Hafner, C. Thanner, M. Hiltunen, J. Hiltunen, J. Dostalek, Plasmonically amplified fluorescence biosensors with scaled up produced chips, 2nd European Biosensor Symposium, Florence, February 18th - 21st 2019 (talk).
23. S. Fossati, A. T. Rainer, S. Hageneder, N. G. Quilis, V. Jungbluth, J. Dostalek, Platform for simultaneous fluorescence and surface plasmon resonance spectroscopy in epifluorescence configuration, Biosensors, June 12-15 2018, Miami, USA. (talk).
24. S. Hageneder, S. Fossati, V. Jungbluth, K. Sergelen, C. Petri, U. Jonas, R. Soldo, A. Weinhäusel, J. Dostalek, Enhancement strategies for a plasmonic biosensor with microarray format for detection of biomarkers, Europtrode, March 25th - 28th 2018, Napoli, Italy. (talk)
25. S. Fossati, S. Hageneder, D. Hafner, H. Hundsberger and J. Dostalek, Multi-diffractive plasmonic gratings for fluorescence sensing, Europtrode, March 25th - 28th 2018, Napoli, Italy. (poster)
26. D. Kotlarek, S. Fossati, J. Dostalek, Plasmonic nanohole arrays supported by a functional hydrogel cushion – towards flow-through biosensor, Europtrode, March 25th - 28th 2018, Napoli, Italy. (poster)
27. M. Minunni et al. (plenary), "Advances in Affinity based sensing"XII Reunion Nacional de Optoelectronica, Evento on line, Spanish Optoelectronic meeting, OPTOEL2021 30/06-2/07 2021, Invited 45 min; plenary, invited by (Javier Mateo jmateo@unizar.es) https://www.sedoptica.es/storage/docs/20210209100324_OPTOEL-2021.pdf

Due to pandemic one international events have been postponed:

28. *M. Minunni et al. "Advances and challenges in affinity based sensing International Symposium on Advances in Pharmaceutical Analysis", july 2022, Nancy, France, (Plenary 50 min, invited by Prof. Igor Clarot)*

29. M. Minunni et al. Reunion Biennal Real Societad Espagnola de Quimica (RSEQ) 28 June-1 July Granada 2022, Spain (Keynote 30 min, Symposium S9. Bioanalytical Chemistry in Health and Food Safety) (invited by Prof. Susana Campuzano) https://bienal2021.com/index.php/en/)

In also these two fore coming events the project will be eventually acknowledged.

Scientific publications related to the project:

30. P. Palladino, F. Torrini, S. Scarano, M. Minunni, 3,3',5,5'-tetramethylbenzidine as multi-colorimetric indicator of chlorine in water in line with health guideline values, Anal. Bional. Chemistry, 412, pages 7861–7869, 2020, 10.1007/s00216-020-02918-9
31. P. Palladino, F. Torrini, S. Scarano, and M. Minunni, Colorimetric analysis of the early oxidation of dopamine by hypochlorous acid as preliminary screening tool for chemical determinants of neuronal oxidative stress. J. Pharmaceutical Biomed. analysis, 179, pages 113016, 2020, 10.1016/j.jpba.2019.113016
32. V. Baldoneschi, P. Palladino, M. Banchini, M. Minunni and S. Scarano Norepinephrine as new functional monomer for molecular imprinting: an applicative study for the optical sensing of cardiac biomarkers, Biosensor and Bioelectronics, 157, 112161, 2020, 10.1016/j.bios.2020.112161
33. V. Baldoneschi, P. Palladino, S. Scarano and M. Minunni, Polynorepinephrine: state of art and perspectives applications in biosensors and molecular recognition perspective article, Anal. Bional. Chemistry, Topical collection, Female role models, 412, pages 5945–5954, 2020, 10.1007/s00216-020-02578-9
34. M.G. Lettieri, P. Palladino, S. Scarano, M. Minunni Protein-templated copper nanoclusters for fluorimetric determination of human serum albumin Microchimica Acta, 2021, 10.1007/s00604-021-04764-7
35. F. Torrini, S. Scarano, P. Palladino and M. Minunni, Polydopamine-based quantitation of albuminuria for the assessment of kidney damage. Anal. Bioanal. Chemistry, 413, pages 2217-2224, 2021, 10.1007/s00216-021-03192-z
36. S. Centi, L. Cavigli, C. Borri, A. Milanesi, M. Banchelli, S. Chioccioli, B. N. Khlebtsov, N. G. Khlebtsov, P. Matteini, P. Bogani, F. Ratto, R. Pini (2020). Small Thiols Stabilize the Shape of Gold Nanorods. Journal of Physical Chemistry C, 124, 20, 11132–11140.
37. Katharina Schmidt, Simone Hageneder, Yasaman Ahmadi, Bernadette Lechner, Maria Minunni, Ivan Barisic, Jakub Dostalek, Affinity interaction-based manipulation of oligonucleotide chains generated by rolling circle amplification for surface plasmon-enhanced fluorescence, 2021, in preparation.
38. Simone K. Auer, Stefan Fossati, Yevhenii Morozov, Fulvio Ratto, Ulrich Jonas, Jakub Dostalek, Plasmonic heating for the observation of rapid swelling and collapsing of pNIPAAm-based polymer networks, 2021, in preparation.
39. Bernadette Lechner, Simone Hageneder, Marc P. Kreuzer, Rick, Cozemius, Ivan Barišić, Jakub Dostalek, In situ monitoring of rolling-circle amplification on a solid support by surface plasmon resonance and optical waveguide spectroscopy, 2021, ACS Applied Materials & Interfaces, in revision.
40. Simone Hageneder, Vanessa Jungbluth, Regina Soldo, Christian Petri, Marjut Kreivi, Andreas Weinhäusel, Ulrich Jonas, Jakub Dostalek, Responsive hydrogel binding matrix for dual signal amplification in fluorescence affinity biosensors and peptide microarrays, ACS Applied Materials & Interfaces, 2021, accepted.
41. Simone Hageneder, et al., Multi-diffractive grating for surface plasmon biosensors with direct back-side excitation, 2020, Optics Express, Vol. 28, Issue 26, pp. 39770-39780.

42. Stefan Fossati, Simone Hageneder, Samia Menad, Emmanuel Maillart and Jakub Dostalek, Multi-resonant plasmonic nanostructure for ultrasensitive fluorescence biosensing, Nanophotonics, 2020, 9, 11, 3673–3685.
43. Patrik Aspermair, Ulrich Ramach, Reiner-Rozman, Ciril, Stefan Fossati, Bernadette Lechner, Moya, Sergio, Omar Azzaroni, Jakub Dostalek, Sabine Szunerits, Wolfgang Knoll, Johannes Bintinger, Dual Monitoring of Surface Reactions in Real-time by Combined Surface-Plasmon Resonance and Field-Effect Transistor Interrogation, JACS, 2020, 142, 27, 11709–11716.
44. Daria Kotlarek, et al., Actuated Plasmonic Nanohole Arrays for Sensing and Optical Spectroscopy Applications, Nanoscale, 2020, 12, 9756 - 9768.
45. Nestor Gisbert Quilis, Simone Hageneder, Stefan Fossati, Simone Auer, Priyamvada Venugopalan, Christian Petri, Alberto Moreno Cencerrado, Jose Luis Toca Herrera, Ulrich Jonas and Jakub Dostalek, UV-Laser Interference Lithography for Local Functionalization of Plasmonic Nanostructures with Responsive Hydrogel, Journal of Physical Chemistry C, 2020, 124, 5, 3297-3305.
46. A joint paper is in preparation for the special issue Rapid Screening in the Life Science Based on Photonics and Plasmonics Technology , Editors F. Ratto and Francesca Rossi, on Sensor, Open Access,

PhD thesis:
Simone Hageneder, Plasmonic nanostructures and polymer biointerfaces for fast, parallelized and sensitive detection of biomarkers, defence planned for September 2021 at University of Natural Resources and Life Sciences (BOKU).
Stefan Fossati, Plasmonics enabled optical spectroscopy for combined optical biosensors, defence planned for September 2021 at Technical University of Vienna (TUW).

Master thesis:
Bernadette Lechner, Rolling circle amplification for plasmonic biosensors, defence in November 2020 at University of Natural Resources and Life Sciences (BOKU).

Simone Auer, defence planned for fall 2021 at Technical University of Vienna (TUW).

Katharina Schmidt, Tailoring of rolling circle amplification for plasmon-enhanced fluorescence readout of oligonucleotide assays, defence planned for summer 2021 at University of Natural Resources and Life Sciences (BOKU).