
# PARTNER PRESENTATION AND INTEREST IN HORIZON EUROPE PARTICIPATION

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| **Name of the organisation** | NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT OF ISOTOPIC AND MOLECULAR TECHNOLOGIES - ITIM |
| **Country** | Romania |
| **Type of organisation** | NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT |
| **Short description** | With more than 70 years of tradition in research, ITIM is nowadays involved in a wide area of micro- and nanotehnologies. The main focus of our developments is on carbon structures, nano/micro-porous materials, magnetic micro/nanogels, thin films, micro/nano-patterned surfaces, magnetic / semiconducting nanoparticles and clusters, novel polymers / copolymers and micro/nanocompozites based on them, or hybride nanosystems built on such platforms. The envisaged major practical applicability domains are: environement protection / depolution, health – including nanomedicine, energy and combating climate changes, nanoelectronics, safety and security, information and communication technology, agriculture. |
| **Laboratory/ Faculty Department** | Research team: “Laser Induced Processes” |
| **Contact person** | Dr. Cosmin Farcău |
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**Short description of Laboratory/ Faculty Department involved**

The expertise of the research team “Laser Induced Processes” in micro- and nano-technologies is related to the fabrication of nanostructured films based on self-assembly of colloidal micro- and nano-particles (metallic, dielectric, semiconducting) or by direct laser writing. We aim to understand and control the optical properties of these materials, and to develop optical molecular sensors based on plasmonic enhancement of analyte-laser light interactions.

**Research topics** include:

- Nanofabrication by colloidal lithography;
- Self-assembly of nano- and micro-particles;
- Photochemical synthesis of metallic nanoparticles and functionalization, and realization of complex patterns by direct laser writing;
- Optical/plasmonic interactions in nanostructured films (experiment and simulation);
- Theoretical investigation of the interaction of laser pulses with microstructured meadia (e.g. waveguides);

- Plasmon-enhanced molecular optical processes (Fluorescence, Raman);
- Photoinduced ultrafast phenomena in nanostructures and photosensitive materials investigated using time-resolved spectroscopy;
- Investigating the molecular structure by ultrasensitive spectroscopic Raman techniques
- Dual optical/electrical sensing based on nanostructures;
- Development of nanosensors for chemical and biological applications based on plasmonic metallic nanoparticles;

**Involved persons. Short CV**

**Dr. Cosmin-Adrian Farcau** (M) is senior researcher at INCDTIM and Babes-Bolyai University, Cluj-Napoca, Romania. He holds a PhD on plasmonic nanostructures (Babes-Bolyai University) and two postdoctoral fellowships on vibrational spectroscopy of Ag nanocrystals and convective self-assembly of colloidal nanoparticles (CEMES and LPCNO, Toulouse, France). His current interests include: nanofabrication, self-assembly of nano- and micro-particles, optical interactions in nanostructured films, plasmon-enhanced molecular optical processes (fluorescence, Raman) and optical/electrical sensing based on nanostructures. He is author of more than 68 WoS-indexed publications, PI of several national (PCE, PED, TE, TD) and international grants (EEA Norway Grant, Ro-Fr bilateral), member of the *Scientific Council* of INCDTIM, member of the Physics Commission of the *National Council for Titles, Diplomas, and Certificates* (CNATDCU). More information can be found at http://en.itim-cj.ro/portfolio/farcau-cosmin/.

**Dr. Alexandra Falamas** (F) is a researcher at INCDTIM working on time resolved molecular spectroscopy. She has received her Ph.D. in 2013 from Babes-Bolyai University Cluj-Napoca, her thesis research including one year at the University of Nottingham working on micro-Raman imaging spectroscopy and fluorescence imaging. Her expertise includes work with metallic colloidal nanoparticles used as surface enhanced Raman spectroscopy (SERS) probes for investigating biological systems, skills on using and aligning the pulsed laser system in our laboratory, as well as vibrational and optical spectroscopic techniques. Her research area at INCDTIM now focuses on developing and investigating hybrid nanosystems for surface enhanced Raman and fluorescence applications. She has experience as Principal Investigator in Post-doctoral grant PN-III-P1-1.1-PD-145/2018 and a Young research teams grant PN-III-P1-1.1-TE-2019-1141.

**Dr. Valer Tosa** (M) received his PhD in Physics in 1992 Babes-Bolyai University Cluj-Napoca. He completed several guest researcher stays at RIKEN Japan (1993-1995, 2001-2003), KAIST South Korea (several months during 2003-2007), Gwangju Institute of Science and Technology, South Korea (several months during 2008-2016), Naples University Italy (several months during 1992-2001), working on topics such as multiple photon excitation and dissociation of polyatomic molecules, Modeling macroscopic high order harmonics generation, attosecond pulse train characterisation. His current interests include temporal / spectral characterization of ultrashort laser pulses using deep learning algorithms, propagation of femtosecond pulses and generation of attosecond pulses in laser-fabricated integrated photonic circuits, numerical modeling of interactions between ultrashort and ultraintense ligh pulses with atoms and molecules, femtosecond pulse propagation in ionizing gases and guided structures. He has published more than 140 WoS-papers, has a H-index factor of 23, and has been project director for 9 national

projects, partner coordinator for 2 FP7 projects, partner coordinator for FET Open project H2020.

**Dr. Attila Bende** (M) received his PhD in 2004 in Theoretical Physics from Debrecen University, Hungary. He has a vast expertise in spin crossover phenomena in organometallic complexes, electronic excited state relaxation processes in molecular structures and theoretical studies of the interaction of the electromagnetic radiation with molecular structures. A.B. has been the Principal Investigator in several grants, such as PN-II-RU-TE-2011-3-0124, PNCDI III - P4 - ID-PCE 2016-0208, and PN-III-P4-ID-PCE-2020-0770. Dr. Bende has a H-index factor of 14 and has authored or co-authored over 90 scientific publications.

**Dr. Nicoleta Tosa** (F) is senior researcher at INCDTIM Cluj-Napoca, Romania (since 2006) and received her PhD in Chemistry in 2009 and master degree in 1995 from Babes Bolyai University Cluj-Napoca, Romania. Her research experience in chemistry and physical-chemistry is coupled with metallic micro- and nanostructures fabrication by CW/pulsed laser direct writing technique, photochemical synthesis of noble metal nanoparticles, functionalization and characterization by structural analysis methods in solid state, thin films and solution. She has 37 publications (30 ISI) and 2 national patents. More details can be found at http://en.itim-cj.ro/portfolio/tosa-nicoleta-ioana/ .

**If you are interested in a particular call, please indicate the Reference of the call/Topic of interest—potential contribution.**

**Have you already participated in an EU funded project? If so, provide some references.**

***Nanostructured microfluidic analytical platform for dual SERS-electrochemical detection of emerging environmental pollutants (POLSENS),*** Collaborative Research Project financed by the Norway Financial Mechanism 2014-2021 and co-financed by UEFISCDI, project code RO-NO-2019-0517.

***eXtreme ultraviolet to soft-X-ray Photonic Integrated Circuits (xPIC)***, project funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No 964588.