Proposal example

This document consists of a proposal example to help participants understand how to fill in a successful project proposal. Participants can use the proposal word template to start filling out their project idea, before submitting it on the EMERGE web portal.

Before proceeding to fill out the project proposal online form, we kindly request that you carefully review the instructions provided in the Proposal Submission Guidelines, as well as the user guidelines accessible at User Guidelines, which contain valuable information on eligibility criteria, proposal evaluation/implementation and travel/ subsistence support.

Typically, 3-5 researchers will be involved in each user project, with travel/accommodation support provided to a maximum of 2 participants per project. All participants involved in the proposal must be registered on the website (Registration Link) and the proposals should be formulated and submitted through the private area of the EMERGE website.

In case of any queries, Technical Liaison Officer (TLO) members from each EMERGE partner (contact list available at this Link) are available before each call's deadline to help applicants shaping their proposals to fully leverage the benefits of the EMERGE infrastructure. Applicants are strongly recommended to contact the preferred host institution(s) to understand if intended materials/procedures to be used already passed a Risk Assessment (RA) process. This assures that in case of proposal approval, its implementation is not delayed. If a RA was not performed yet, applicants should fill this template form and send it to the host institution contact (contact list available at this Link) and to info@emerge-infrastructure.eu as soon as possible.

Conceptual idea: ABC Research Institute, Italy (ABC-RI) will investigate development of biosensor printed on flexible substrate using self-developed printable inks (Silver, Gold, Carbon). The inks will be printed on different substrates (PET, Kapton, Paper) using screen printing, inkjet printing and/or aerosol jet printing and will be sintered using thermal and photonic curing system (Pulseforge) at RISE, Norrkoping, Sweden.
Rheological characterization of inks, and post printing characterization using adhesion tester, SEM and will be carried out.

Expected total duration of project: 5 units of access i.e. 5 working days

1. General Proposal Data

- **Title*** *(max 150 characters)*: **Printing and characterization of all-in-one sensors using custom printable inks and different printing techniques**

- **Type of material system/ device and its application*** *(max 150 characters)*: **Silver, gold, carbon inks and novel sensing material synthesized by ABC-RI for impedimetric sensor for diagnosis of all diseases.**

- **Primary TA*** *(select one option – this should be the TA where most of the proposed work fits)*:
  - **TA1 – Theory: Modelling, simulation, and design of materials, devices and systems**
    - Device design and architectures
    - Modelling & simulation
  - **TA2 – Materials synthesis and ink formulation**
    - Chemical & physical techniques
    - Materials characterization
  - **TA3 – Prototype fabrication**
    - Device preparation
    - **Functional 2D and 3D printing**
    - Industrial printing
    - Nanoimprinting & laser patterning
    - Vacuum assisted deposition
  - **TA4 – Characterization of prototypes and demonstrators**
    - Device metrology and characterization
    - Validation and standardization

- **Secondary TA** *(optional, select the applicable options, in case the proposed work goes beyond the Primary TA)*:
  - **TA1 – Theory: Modelling, simulation, and design of materials, devices and systems**
    - Device design and architectures
    - Modelling & simulation
  - **TA2 – Materials synthesis and ink formulation**
    - Chemical & physical techniques
    - Materials characterization
  - **TA3 – Prototype fabrication**
    - Device preparation
    - Functional 2D and 3D printing

        - Industrial printing
        - Nanoimprinting and laser patterning
        - Vacuum assisted deposition
    - **TA4 – Characterization of prototypes and demonstrators**
        - **Device metrology and characterization**
        - Validation and standardization

- **Keywords*** *(max 7 keywords, separated by comma)*: **Impedimetric biosensor, screen-printing, inkjet-printing, aerosol-jet-printing, photonic sintering**

- **Maturity of the work*** *(select one option)*:
    - Basic idea
    - **Proof of concept**
    - Laboratory scale

- **Publications from previous work*** *(select one option)*:
    - No
    - **Yes**
        - Insert DOI (Digital Object Identifier) / title* *(List up to 5 most recent publications)*: **https://www.mdpi.com/1424-8220/20/1/274**

- **Is this proposal associated with a previous project idea submitted to the EMERGE project?*** *(select one option)*:
    - No
    - **Yes**
        - Proposal ID number* *(identify the number of the proposal you submitted in a previous Call)*: **1234**
        - Proposal Title* *(identify the title of the proposal you submitted in a previous Call)*: **Synthesis and characterization of sensing nanostructures for formulating a functional ink compatible with printing technology and flexible substrates**

- **Do you belong to the EMERGE external review panel?*** *(select one option)*:
    - **No**
    - Yes *(if you or your team members are part of external review panel (ERP) and/or Selection committee board (SCB) of EMERGE who are invited for reviewing EMERGE proposals)*

2. Scientific Case

The “Scientific case” is the main content used for the evaluation and ranking of user proposals by the scientific committee.

- **Scientific context and objectives*** *(max 3000 characters): Identify the problem/ hypothesis to be addressed by the project, having in mind the state-of-the-art of the topic.*

✓ **There are lot of health problems in world, we aim to develop point of care device that solves all problems using simple impedimetric biosensor printed using various printing techniques on different substrates.**
✓ **Gold and carbon inks are widely being exploited for biosensor applications. At ABC-RI we have developed novel sustainable inks that could potentially be printed using Screen, inkjet or aerosol jet printing.**
✓ **We have investigated printability of our inks using inhouse desktop inkjet printer, but upscaling and of sensor fabrication using other printing techniques, fast sintering methods and characterization of printed features are vital for the further development of our biosensor.**
✓ **Semi industrial scale printing equipment such as DEK and ATMA screen printers, Pulseforge photonic sintering equipment and investigation of adhesion of printed structures with different substrate materials will be investigated at RISE.**
✓ **Different substrates such as PET, Kapton, Photo paper, and wood will be investigated for printing of our inks.**
✓ **These proof of principle experiments can lead to future larger project in collaboration with RISE and other EMERGE partners in the field of health and medtech.**

- **Samples/materials required*** *(max 750 characters): If applicable, provide details on the materials to be synthesized/deposited, mention if there are specific precursors/reagents required, if there are hazardous materials involved. Safety data sheet of materials need to be provided to host institution for risk assessment before execution of project/proposal.*

✓ **Gold, graphene inks developed by ABC-RI**
✓ **Carbon, silver inks for contact electrodes will be provided by the host institution**
✓ **Substrate materials such as Paper, PET, Kapton provided by the host institution**
✓ **Screens for Screen printing and other lab consumables provided by the host institution**
✓ **Gold ink contains solvent that is explosive at high temperature, printing needed with well-ventilated printing area. SDS will be provided for Risk assessment.**

- **Workplan*** *(max 4000 characters): Describe the work to be carried out, dividing by multiple tasks if needed. Provide an estimate on the time required to perform the workplan (ideally between 3 and 10 days for the Call for Projects).*

- ✓ **Day 1: Lab introduction and basic training of equipment. Rheology of different inks from ABC-RI**
- ✓ **Day 2: Screen printing of IDE electrodes on PET, Kapton and Paper substrate.**
- ✓ **Day 3: Inkjet and Aerosol jet printing of sensing ink materials from ABC-RI on IDE electrodes printed on day 1.**
- ✓ **Day 4: Investigation of photonic sintering of printed materials. LASER cutting of individual sensors from printed sheet for further characterization.**
- ✓ **Day 5: Characterizing adhesion of printed inks with different substrates using peel tester and electrical characterization of devices using parameter analyzer; resistivity measurement using four probe measurement.**

- **Expected outputs*** *(max 2500 characters): Describe the main expected results and their potential contribution for Flexible Large-Area Printed Electronics and Photonics (FLAPEP).*

- ✓ **Investigation and learning of different printing and characterization techniques available at RISE.**
- ✓ **Investigation of printability and conductivities of Inks from ABC-RI for future sensor development on different substrate materials.**
- ✓ **Investigating compatibility, adhesion of inks with different substrates.**
- ✓ **Initiating and fostering collaboration between ABC-RI and RISE for future joint projects and international proposals in the field of Sensor technology.**
- ✓ **Exchange of knowledge related to inks development and printing techniques.**

- **Additional information** *(max 1500 characters): If applicable, specify if there is any additional information that deserves attention from reviewers.*

- ✓ **We need lot of air and water, and some cellulose additives in printable inks of gold, silver, copper, carbon etc.**
- ✓ **Our custom inks need storage at 4 ºC and thawing at room temperature before use.**

- **References***: *Provide a reference list used to elaborate the sections above. If applicable, include links with DOI.*

- ✓ **M.Y.Mulla et al. Journal of problem solving using printed electronics, vol 99, No 99, (Mar. 2099)**

3. Experimental Plan

This section is relevant to evaluate the feasibility of the scientific proposal described in the previous section within the EMERGE infrastructure. Users must fill it considering the "Services & Infrastructures" listed at EMERGE website and the Primary/Secondary TA selected in "General Proposal Data" section.

- **Techniques required**
  - Technique*: *e.g. SEM, AFM, Spin-coating, Gravure printing; only one technique per text box; click the button "add" to insert more techniques.*

  - Specific needs *(optional): if the user has any specific needs regarding the technique selected above, a note should be added in this text box (e.g., low acceleration voltage SEM due to surface sensitive samples. This will help the TLO to attribute the most appropriate tool for the work.*

Technique #1: Screen printing
Special needs (optional): Our device architecture require annealing step between printing steps, access to thermal oven is needed.

Technique #2: Inkjet printing
Special needs (optional): Our device architecture require annealing step between printing steps, access to thermal oven is needed.

Technique #3: Aerosol jet printing
Special needs (optional): Our device architecture require annealing step between printing steps, access to thermal oven is needed.

Technique #4: Parameter analyzer
Specific needs (optional): not applicable.

Technique #5: Potentiostat
Specific needs (optional): not applicable.

Technique #6: Rheometer
Specific needs (optional): not applicable.

Technique #7: Peel tester
Specific needs (optional): not applicable.

Technique #8: four probe system
Specific needs (optional): The resistivity of printed conductors is very low, hence need of four probe system for accurate measurement of resistivity.

- **Preferred institutions to conduct the project**
  - Institute*: *select the preferred institute to conduct the project. Please note that depending on the selected TA and techniques, your project might require 2 institutes for implementation. Click the button "Add" to insert additional institutes and/or a 2nd preference for the main institute to develop your work. The TLO will then attribute an approved workplan to one or multiple institutes depending on availability.* **Research institutes of Sweden (RISE)**

4. Co-proposers

You can add a co-proposer to this project to also benefit from travel and accommodation support, according to the rules established for access by the

EMERGE project (https://emerge-infrastructure.eu/apply-for-innovation/user-guidelines/).

- **Email:** *insert the email address of the co-proposer, and then click the button "add as co-proposer".* **Co-proposer@gmail.com**

- **Justification**. *(max 750 characters): provide a justification to include a 2nd participant in the project.* **The inclusion of [Colleague's Name] in our project is justified based on his/her expertise in the project topic, complementary skill set, potential for collaboration and knowledge sharing, increased productivity, strengthened validity and reliability of outputs, and future collaboration opportunities. By involving my colleague [Colleague's Name], we can ensure a comprehensive approach, enhance the quality of our research, and maximize the project's impact.**

5. Terms and Conditions*

☒"I agree to EMERGE terms and conditions": *activate the checkbox to accept EMERGE terms and conditions, which is a requirement to enable proposal submission. By clicking the "terms and conditions" hyperlink the terms and conditions text opens in a new tab.*

6. Validation & Submission

In this section the user is presented with a summary of the project proposal, showing all the information entered in the previous sections. The user has the opportunity to edit any of the information previously entered by clicking the buttons "edit" throughout the summary of the project proposal. At the end, the user must click the button "submit proposal" so the final proposal is submitted.
The user is acknowledged with a message mentioning the proposal was submitted successfully.
The submitted proposal can then be reviewed in the menu "My Proposals", section "My Dashboard", and can still be edited until the closing of the Open Call for FLAPEP-related projects.