B

Biogenic
Organotrophic
Wetsuits

W

BOW will set a general and viable paradigm for synthetic nanodevices with a biogenic surface

Nanoscale is a term used for objects that are intermediate in size between the largest biomolecules and the smallest objects that can be fabricated. That is, objects with the smallest dimension ranging from few to hundreds nanometers (a nanometer is a billionth of a meter).

EV nanoparticles are key players in inter-cellular and inter-organism communication. They mediate different physiological and/or pathological processes by enabling spreading of diseases. This special ability of EVs is given by their membrane surface. The magnetic nanoparticles camouflaged by EV membrane, that BOW will create, will gain key biomimetic functions, including evasion to the immune system and organ site/ tumour targeting.

BOW will reinvent and harness extracellular vesicles (EVs) to naturally tailor the biological identity of synthetic nanodevices and nanomaterials, while being disruptive as a first example of biogenic nanotechnology and impacting life quality for people.

Objectives

The main objective of BOW is to create hybrid magnetic nanoparticles with a membrane surface made from extracellular vesicle.

1

Produce high-grade small EVs with biomimetic and organotropic functions.

2

Synthesis and functionalization of magnetic nanoparticles.

3

Engineering a microfluidic device for streamlined fabrication of EV membrane coated magnetic nanoparticles (evMBDs).

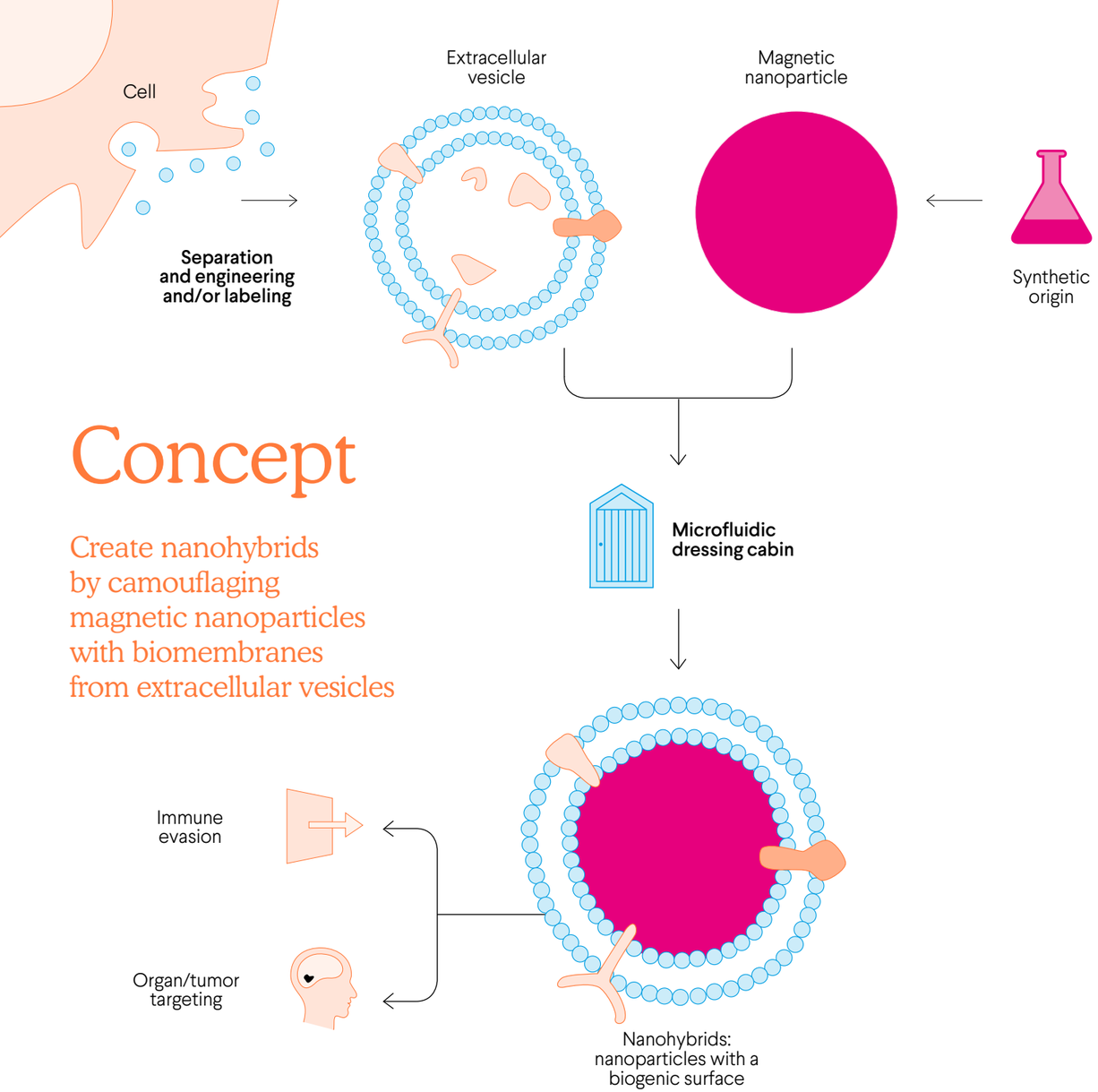
4

Evaluation of magnetic nanoparticles biological performances and nanotoxiciy in-vitro, ex-vivo and in-vivo.

Approach and Impacts

The implementation of BOW will be framed in three logically interlocked activities, the nanomaterials fabrication and characterization, the microfluidic dressing, and the biological performance testing.
If successful, this nanohybrid can be a novel high-risk/high-reward paradigm that can promote the progress of implantable nanodevices and nanomaterials towards a sustainable production and contributing to strengthen and keep in the lead position of European biotechnology.

The project will contribute to the progress of biogenic interfaces for cell and organoid-on-a-chip support/interaction and will impact the next studies on biogenic nanotechnology– which will be crucial to address global issues, such as water pollution and decontamination, antibiotic resistance, non-communicable diseases (NCDs) or food safety – contributing to reshape the perspective on life science, the environment and public health.



Concept

Create nanohybrids
by camouflaging
magnetic nanoparticles
with biomembranes
from extracellular vesicles

Training and Education

BOW will address challenges in training next-generation scientist in several disciplines, ranging from fundamental physical chemistry to biology and material engineering. Tightening the collaboration between the consortium labs, the young scientists hired will be systematically exchanged between the labs, providing them with unique integrated interdisciplinary competencies matured on bench-work activities.

In this community, the training and scouting of young researcher is one of the priorities also pursued through the organisation of winter/summer schools.

This global interdisciplinary view that will enhance the personal capabilities of future investigators and/or entrepreneurs, and special as a complementary training within BOWs implemented education and training.

Who is involved?

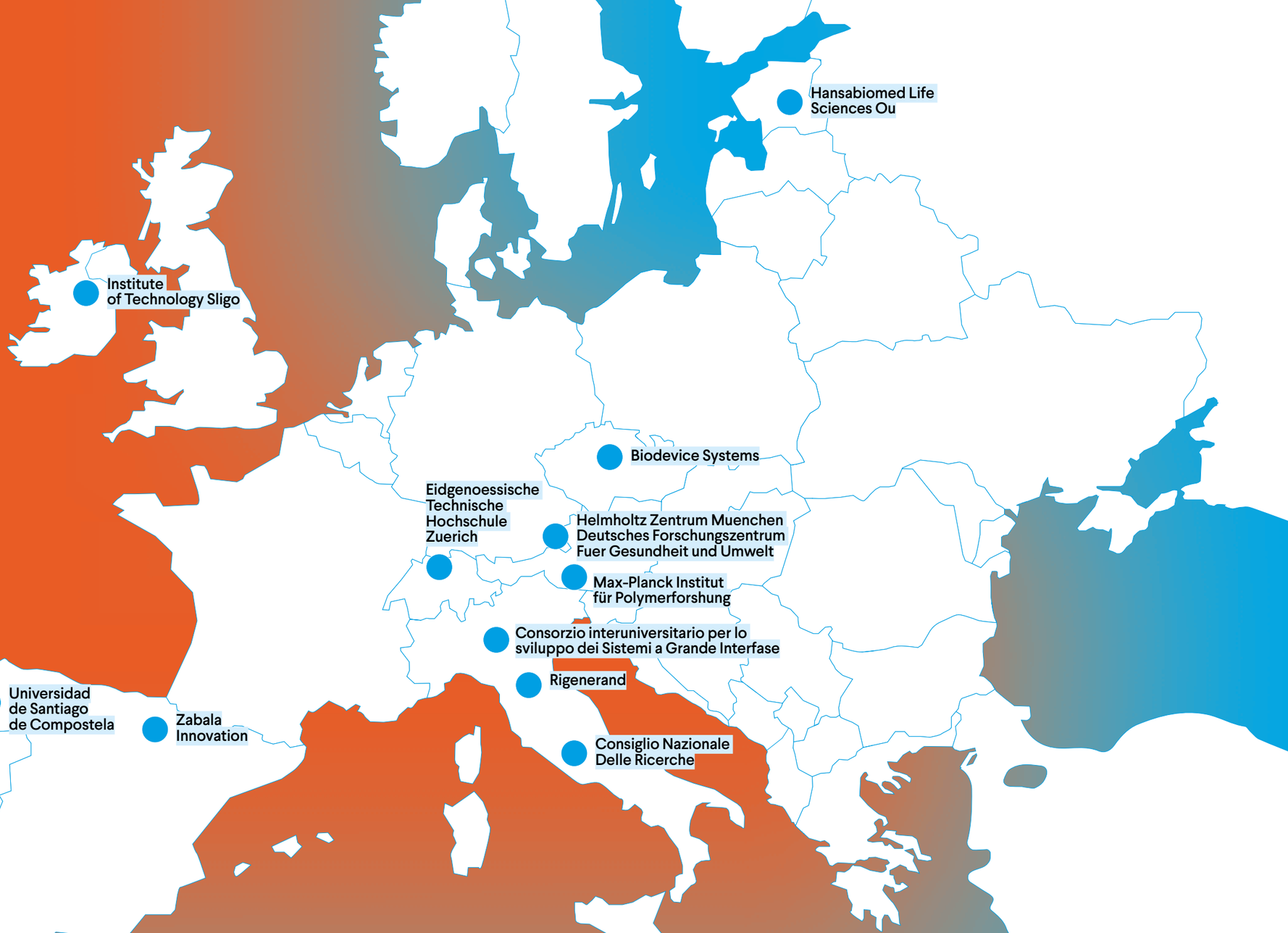
BOW will be made possible thanks to a balanced ecology-biology-biophysics-chemistry-engineering matrix, of well-established and internationally recognized academics (7), high biotech SMEs (3), plus 1 innovation consulting, contributing to strengthen European pool of expertise and biotechnology innovation eco-system.

The team is composed of the coordinator of the project, Consorzio Interuniversitario per lo Sviluppo Dei Sistemi A Grande Interfase and Consiglio Nazionale Delle Ricerche, Universidad de Santiago de Compostela, Max-Planck-Gesellschaft Zur Forderung der Wissenschaften EV, Helmholtz Zentrum Muenchen Deutsches Forschungszentrum Fuer Gesundheit und Umwelt Gmbh, Institute Of Technology Sligo - ITS, Eidgenoessische Technische Hochschule Zuerich, Hansabiomed Life Sciences Ou, Biodevice Systems Sro, Rigenerand Srl and ZABALA Innovation Consulting.

Who is involved?

BOW brings together a strong and complementary consortium, including 11 partners from 7 European countries (Italy, Spain, Germany, Ireland, Switzerland, Estonia, and Czechia).

The project also counts on the participation of several sub-units of the partners. Those are: CSGI (University of Brescia and University of Florence) and CNR (Institute for Biomedical Research and Innovation (IRIB), Institute of Biosciences and BioResources (IBBR), Institute of Biophysics (IBF) and the Institute for the Study of Nanostructured Materials (CNR-ISMN).



BOW

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