

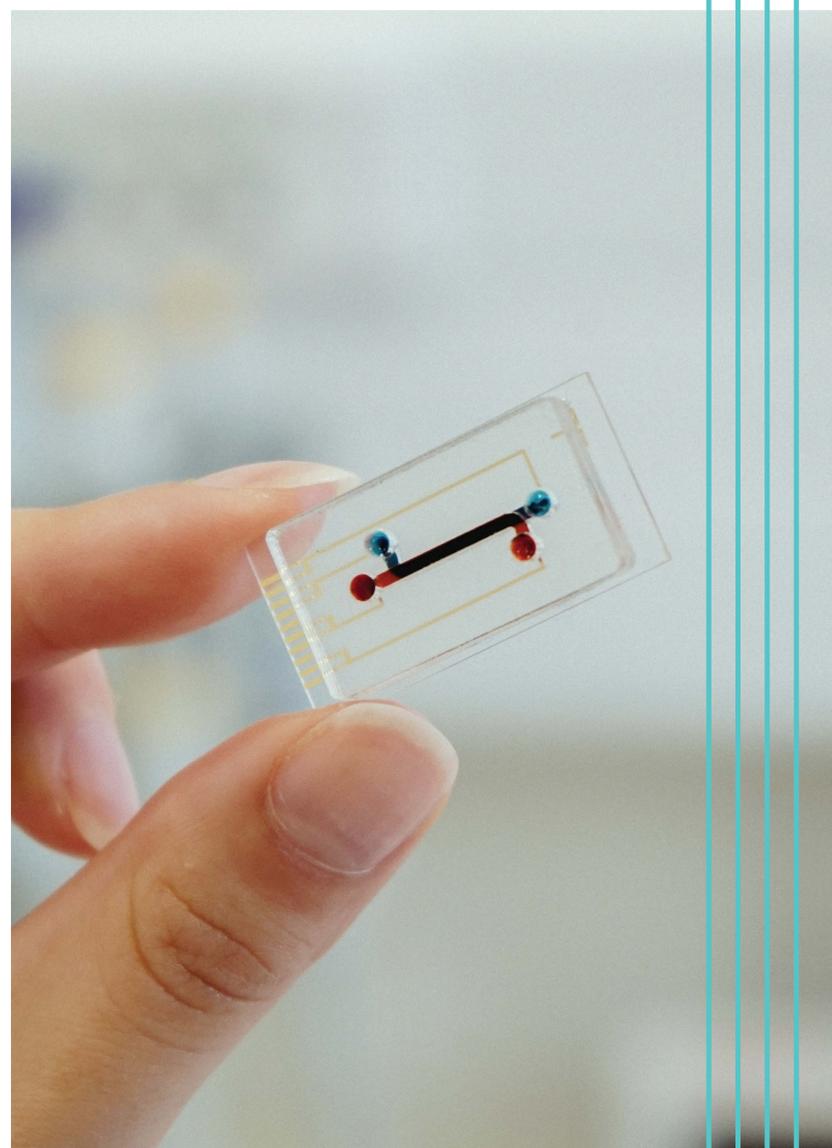
# GUT-CHIP

Sensorised cell-laden microfluidic devices to replicate the functionality of the human gastro-intestinal tract.

From an engineering point of view, orally administrated compounds must first resist a series of physical and chemical processes (digestion) and then cross a physical barrier (intestinal absorption) to reach systemic circulation.

The INL Gut-Chip provides a faithful representation of the human intestinal epithelial barrier. The device houses two parallel microchannels separated by a flexible, semi-permeable membrane where human cells either from immortalised or primary sources, are cultured to form a cohesive epithelium. The top and bottom channels represent the intestinal lumen and microvasculature respectively. Patterned sensors provide real-time sensing of barrier integrity by measuring electric impedance across the epithelium. Automated control allows high user-independent reproducibility, spatiotemporal resolution of stimuli delivery and outflow sampling.

The devices offer the capacity to be coupled to upstream gastrointestinal simulators also developed at INL for comprehensive bioaccessibility and bioavailability studies. Additional applications include drug screening and toxicology, disease modelling (Crohn's, ulcerative colitis), and personalised medicine.



## + Features

**Continuous media perfusion**

**Automated time-resolved sampling** (using segmented flows)

Integrated sensors (TEER)

**Direct on-chip microscopy imaging** (from the use of transparent materials and small device dimensions)

## + Suggested applications

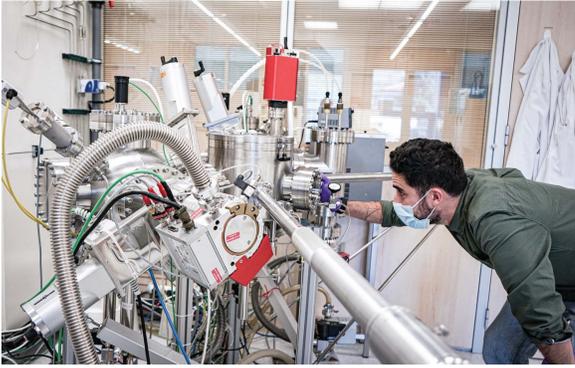
**Bioaccessibility and bioavailability studies**

**Drug screening and toxicology**

**Disease modelling** (Crohn's, ulcerative colitis)

**Personalised medicine** (using primary intestinal organoid derived cultures)

**TRL**  
4



# YOUR WORLDWIDE PARTNER FOR SCIENCE & INNOVATION



Shaping the future together in Clean Energy, Food, Health, Smart Digital NanoSystems, Sustainable Environment and Advanced Materials & Computing.

## 01 SCIENCE

Discover our areas of research and expertise, where we dive into nanoscience and intermix various disciplines to transform it into nanotechnology.

## 03 SERVICES

INL has state-of-the-art scientific equipment which can be used by internal and external stakeholders within the research, technology, and innovation fabric. You can access this open facility with expert support, either remotely or in-person, for full-service or for independent use after initial in-house training.

## 02 TECHNOLOGY

By nourishing on our multiple disciplines in house and with partners, we develop and deploy solutions to the market.

## 04 SOCIETY

INL is committed to disseminating to all audiences the nanotechnology concepts, to bring society closer to our scientific developments. Visit our website and explore our activities and events.

For more information:



+ [innovation@inl.int](mailto:innovation@inl.int)

[www.inl.int](http://www.inl.int)

Av. Mestre José Veiga,  
Braga 4715-330, Portugal

Follow us:

 @inlnano

 @inlnano

 @inlnano

 @inlnano

 @INLInternationalIberianNanotechnologyLaboratory