Title (tentative):  Printable mechanical sensors for soft membranes supporting cardiac slices

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Motivation and application domain
Cardiac slices retain multicellular composition and structural organization native of the original organ from which they are extracted, for up to 6 days in vitro. The model is not yet validated for chamber-specific or disease-specific investigation. Novel technological tools need to overcome the lack of multimodality and the upscaling issues of the in vitro tools existing to investigate tissue electromechanical coupling.

General objectives and main activities
This proposal aims to design, fabricate and test an electromechanical sensor on soft substrate for cardiac tissue slices. Below are described the activities divided between the involved institutions.

DIBRIS â€“ UNIGE: Sensorized membrane design, fabrication, mechanical tests (elastic properties, fatigue), strain-dependent electrode and strain gauge sensor characterization.

IHU-LIRYC: Sensorized membrane design, sensor-acquisition system interface, cytotoxicity test with cardiac and non-cardiac cell lines, cardiac slice testing

Training Objectives (technical/analytical tools, experimental methodologies)
The candidate will learn how to design and prototype a case-specific biomedical sensor for in vitro applications. In particular, the successfully will learn how to manufacture stretchable sensors on soft substrate with inkjet printing technology. They will learn how to characterize its features via mechanical, electrical and biological assays, and validate its ultimate use as cardiac tissue (bio)sensor

Place(s) where the thesis work will be carried out:  DIBRIS and IHU-LIRYC (Bordeaux, France).

Maximum number of students:  1