

PhD Project at Université Paris-Saclay Research Unit SayFood, Palaiseau, France

Bioinspired robotics to understand how food structure affects salivation, mastication, texture perception and swallowing.

Context and Rationale

Various complementary *in vitro* approaches have been developed over the past ten years to study different aspects of Food Oral Processing (FOP), namely salivation, oral lubrication, and swallowing [1, 2, 4, 3, 5, 6]. This doctoral project aims to better understand the effect of food structure and acidity on salivation, mastication, bolus formation, texture perception and swallowing and to reproduce realistically and holistically these key mechanisms *in vitro*.

Project outline

This project will start with a complete analysis of the scientific literature on the mechanisms governing salivation, followed by the development of sensors for real-time measurement of food and bolus properties during Food Oral Processing. Such novel sensors will be used for a more realistic control of *in vitro* food oral processing. A sensory study and an *in vivo* characterization of the effect of different food products on salivation and bolus formation will also be performed and used to calibrate the *in vitro* food oral processing experiments (Fig.1). *In vitro* and *in vivo* measurements will be used to understand how food structure affects salivation, mastication, texture perception and swallowing.

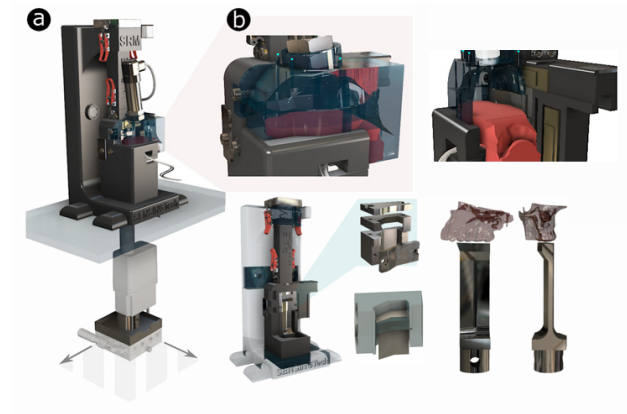


Figure 1: *In vitro* mastication and oral processing, using soft robotics (Adapted from [6])

Supervisory team, candidate profile and application process

This 3-year PhD project fully funded by Carnot Qualiment will be directed by Marco Ramaioli and Anne Saint-Eve at the research unit Sayfood, Université Paris-Saclay. A collaboration is also envisaged with Carole Prost [7] at Oniris, Nantes. **The ideal candidate holds a engineering or master degree in Robotics, Mechanical, Chemical or Food Engineering.** Applications are accepted on a rolling basis and will be evaluated as they are received. **The recruitment will close once a suitable candidate is identified, and no later than November 6th 2026.** Applications should be addressed to marco.ramaioli@inrae.fr and comprise a CV, a motivation letter and academic transcripts. Fluency in English is required, as well as significant previous experience in instrumentation.

References

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