



A PhD position is available to drive a multidisciplinary research project combining ^{23}Na Magnetic Resonance Imaging developments, *in vivo* aroma compounds release measurement and sensory evaluation with the aim to optimize the use of discretionary salt.

This PhD work is a collaboration between two labs from INRAE (previously INRA). The first one, AgroResonance (Clermont-Ferrand, France), is a team specialist of NMR/MRI while the second one, CSGA (Centre des Sciences du Goût et de l'Alimentation, Dijon, France), gathers experts of flavor, food oral processing and perception. This work will be carried out in Clermont-Ferrand in the center of France during the first year (starting in September 2020, ideally) and then in Dijon, Burgundy, for the second and third years. This PhD is part of the ANR-funded project Sal&Mieux which purpose is to optimize the use of discretionary salt. To do so, one should first understand how the added salt behaves in the food matrix (**Q1**) and secondly how the salt released from the food matrix is perceived in the mouth and how the aroma perception is modulated in the course of this dynamical process (**Q2**).

To address Q1: complementary physicochemical (atomic absorption spectroscopy, modelling) and imaging approaches (^{23}Na Magnetic Resonance Imaging) will be developed and used to quantitatively evaluate the distribution of sodium for a variety of food matrices and their preparation process. Sodium MRI will be performed using high field MRI equipment to tackle the mechanisms underlying the effects of the target factors on both 3D spatial distribution and bounding of salt. The same approach will be applied to water to understand further salt release and perception mechanisms. The PhD student will have to set-up the MRI experimental design, perform experiments (after training if necessary), analyze the data and construct water and salt transfer mathematical models and publish the results.

To address Q2: The temporal release of sodium in the mouth during consumption of food products will be characterized using *in vitro* and *in vivo* recordings. Salt release will be monitored *in vitro*, using a dedicated mouth simulator, according to a variety of food matrices and their preparation process. Simultaneous *in vivo* recordings will encompass (i) dynamic salt release and dynamics of pH in mouth using in-mouth sensors; (ii) salt-associated aroma compounds release to evaluate the potency of aroma compounds on overall salty flavor and (iii) temporal sensory perception. The PhD student will have to set-up the coupled sensory/chemical analysis design, will perform experiments, will analyze the data and publish the results.

We are looking for a candidate having good knowledge on biophysical and/or physicochemical analysis and open to food science, sensory science and statistics. Skills in both French and English would be highly appreciated. Ideally, the PhD work will start on the 1st of September 2020 and no later than the 1st of January 2021. Applications will be considered until the position is filled. Interested candidate should email their CV, motivation and recommendation letters, as well as last two years grades to:

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