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Modulation of taste intensity using heterogeneous distribution of taste active molecules in liquid foodstuffs

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The food industry is facing great challenges in nutrition since the middle of the 20th century to delight consumer with natural, nutrionally balanced yet tasty offerings. The heterogeneous repartition of tastant (e.g. sodium chloride, sucrose) as means to enhance taste perception without nutritional impact has been investigated for the past decade. The method of choice has so far been to use gels of alternative layered concentration or controlled delivery using gustometers and a record of sensory perception to assess the tested pattern performance. Yet there is neither a scientific understanding of the phenomena, neither a robust pattern that has been identified to trigger a specific sensory modulation.

In this work, a specific pattern enabling to enhance taste perception is predicted using a previously published mass transfer model of taste transport the oral cavity. The pattern is confirmed using gustometry and model liquid food structures. In this way a very significant 80/20 win in paired comparison test (n=24) against a homogenous reference is achieved. Conversely, a 20/80 loss is achieved when the pattern is reversed (n=24) as also predicted by the proposed model.

The approach is then used to enable a significant reduction (up to 50%) in tastant using the taste enhancing pattern with no sensory impact. Such work is thus valuable for the food industry to master its future challenges in nutrition, without compromising sensory perception or using poorly perceived high intensity sweeteners.