**Gelatinization of waxy and non-waxy rice starch under high hydrostatic pressure (HHP) as influenced by alginate addition.**

P Rivero-Ramos1, T Sanz2, D Rodrigo-Aliaga2, C Molina-Rosell3 and M Benlloch-Tinoco1.

*1Department of Applied Sciences, Northumbria University, Newcastle Upon Tyne NE1 8ST, Tyne & Wear, England, United Kingdom*

*2Department of Food Safety and Preservation, Institute of Agrochemistry and Food Technology (IATA-CSIC), Av. Agustín Escardino 7, Paterna 46980, Valencia, Spain*

*3Department of Food and Human Nutritional Sciences. University of Manitoba, Winnipeg, Canada*

High hydrostatic pressure (HHP) processing is reported to induce gelatinization in starch molecules1. Pressure-mediated gelatinization of starches from a wide variety of botanical sources including rice has been extensively reported in literature2. The majority of reported investigations on HHP-induced rice starch gels did not explore the impact of the addition of distinct types of alginates. In this work, HHP-induced waxy and non-waxy rice starch gels in combination with two alginate types (SAT1, SAT2) with distinct M/G ratios were produced by applying HHP up to 500 MPa at 20°C for 20 min. Impact on the physicochemical properties of the obtained gels was investigated and compared to the heat-gelatinized counterparts by rheological and texture determinations, crystallinity (XRD), microstructure (SEM), short-range ordered structure (FTIR) and retrogradation (DSC). Overall, lower G’ and G” values (*p* < 0.05) and SEM graphs suggested a less damaged granular structure in the pressure-gelatinized non-waxy rice starch formulations in comparison to the heat-induced counterparts, demonstrating incomplete gelatinization. Contrarily, pressure-induced waxy rice starch gels were more sensitive to pressure processing due to the lack of amylose, which induced complete gelatinization as suggested by the higher (*p* < 0.05) G’ and G” values and SEM graphs in comparison with the thermal-gelatinized counterparts. These findings were then further confirmed by XRD, FTIR and texture determinations, and suggest that HHP processing could be regarded as a novel green-processing approach to physically gelatinize  
and/or modify of starch-alginate systems.

*References:*

1 Hu, X., Xueming X., Zhengyu J., Yaoqi T., Yuxiang B., and Zhengjun X. (2011). Retrogradation  
properties of rice starch gelatinized by heat and high hydrostatic pressure (HHP). *Journal of Food  
Engineering*, 106(3), 262–266.

2 Han Z., Shi R., and Da-Wen S. (2020). Effects of novel physical processing techniques on the multi-  
structures of starch. *Trends in Food Science & Technology*, 97, 126–135.