

**Thesis title:** Evaluation of portable vibrational spectroscopy equipment combined with multivariate analysis for food applications

**Author:** Jorge Mellado Carretero

During these last decades, vibrational spectroscopy has gathered attention in the food science field because it provides ways of analyzing and characterizing a wide range of food commodities in a fast and simple manner. Moreover, their cost-effectiveness, reproducibility, and sensitivity have also been proved. Recently, with the advent of nanoelectromechanical systems, vibrational spectroscopy has experienced a breakthrough regarding its miniaturization, achieving in certain equipment sizes as small as a palm. Miniaturized spectroscopic devices open new possibilities towards the applications of vibrational spectroscopy for the in-situ analysis of several quality control parameters without altering the sample. The objective of this doctoral thesis was to evaluate the feasibility of portable Raman, mid-infrared and near-infrared spectrometers combined with powerful chemometric algorithms for food applications comprising studies of chemical (Maillard reaction monitoring or edible insect powder discrimination), physical (extraction force prediction in cork stoppers), and microbiological (discrimination of bacterial and yeast strains).