

## PhD programme in FOOD ENGINEERING AND BIOTECHNOLOGY

Research project and supervisor	
Title	Supervisor(s)
<p><b>1. Antioxidant reactivity and capacity of food matrices during processing and storage by combining DSC, electrochemical and NMR techniques</b>                      (cf: <a href="#">Smart Specialisation Strategy Innovazione e Ricerca Alto Adige 2030 - Smart Specialisation Strategy (RIS3) della Provincia Autonoma di Bolzano - Alto Adige</a> – only available in Italian and German)</p> <p>This research project aims to investigate the mechanisms by which antioxidants neutralize free radicals, focusing on the synergism that different antioxidants exert in inhibiting oxidizable food substrates. The study will investigate the stability of antioxidants during food processing and storage and how interactions between antioxidants and nutrients such as fats, proteins and carbohydrates influence antioxidant efficacy. The project is divided into three phases: (1) development of methods to study free radical scavenging mechanisms and synergistic effects using kinetic-based assays (DPPH-kin, ORAC-kin) and HPLC methods coupled with electrochemical detection recently published by the proponent group; (2) evaluation of antioxidant stability during processing and storage using differential scanning calorimetry (DSC) to simulate realistic food processing conditions; and (3) investigation of antioxidant-nutrient interactions using the above techniques together with nuclear magnetic resonance (NMR). This research addresses significant gaps in the literature by combining DSC, electrochemistry, and NMR to provide a comprehensive and integrated analysis of antioxidants. Expected results include improved understanding of antioxidant mechanisms, identification of synergistic combinations, improved stability methods, and insight into nutrient interactions, contributing to the development of functional foods and evidence-based dietary recommendations. The innovative aspect of this research is the study of antioxidants in real food formulations and the simulation of food processing, which will have a significant impact on the development of functional foods and practical applications in the food industry.</p>	<p>Prof. Matteo Mario Scampicchio</p>