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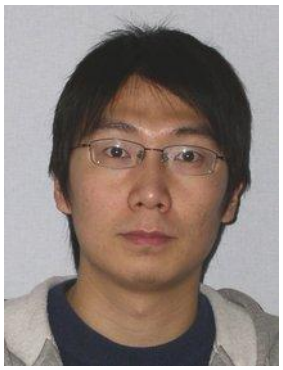

Chemical and enzymatic modification of milk proteins for emulsion applications

Renewable raw materials contain significant amounts of proteins, which can be transferred into a range of industrial useful components. Chemical or enzymatic modifications can improve the functionality of these proteins to broaden their use. Protein emulsifiers have been commonly utilized in various industrial fields such as pharmaceuticals, cosmetics and foods. The aim of my PhD work is to investigate the impact of different chemo-enzymatic modifications on the behaviour of proteins in emulsions. Specific objectives include: **1.** to optimize the emulsifying properties of proteins by shifting their pI to both acidic and alkaline pH regions, **2.** to chemically modify proteins and increase their reactivity towards cross-linking enzymes, **3.** to improve both physical and chemical stability of protein emulsions by cross-linking reactions.

So far, succinylation and ethylene diamine modification were found to be useful to manipulate the pH stability of protein emulsions (Publication 1). Vanillic acid modification has been proven to enhance the laccase-catalyzed cross-linking of protein emulsifiers (Publication 2). The study of oxidative stability of cross-linked emulsions is in process.

Publication 1: Hairan Ma, Pirkko Forssell, Riitta Partanen, Rauni Seppanen, Johanna Buchert, and Harry Boer. Sodium Caseinates with an Altered Isoelectric Point As Emulsifiers in Oil/Water Systems. *J. Agric. Food Chem.*, **2009**, *57* (9), pp 3800–3807

Publication 2: Hairan Ma, Pirkko Forssell, Riitta Partanen, Johanna Buchert, and Harry Boer. Improving Laccase Catalyzed Cross-Linking of Whey Protein Isolate and Their Application as Emulsifiers. *J. Agric. Food Chem.*, **2011**, *59* (4), 1406-1414