

# **Study of Crystallization Properties of Soft Palm Mid Fractions for Specialty Fats Production**

Véronique Gibon<sup>1</sup>, Peggy Dijckmans<sup>1</sup>, Gijs Calliauw<sup>1</sup>, Bart Goderis<sup>2</sup>, Wim De Greyt<sup>1</sup>

<sup>1</sup> Desmet Ballestra Group, Zaventem (Belgium)

<sup>2</sup> Katholieke Universiteit van Leuven, Heverlee (Belgium)

Specialty fats are largely used in chocolate and confectionery industry for a partial or total replacement of cocoa butter. They are usually classified in three categories: cocoa butter equivalents (CBEs), cocoa butter substitutes (CBSs) and cocoa butter replacers (CBRs) and mostly developed from palm oil, palm kernel oil and partially hydrogenated oils. The hard palm mid fraction is an important source for CBE production but severe quality standards have generally restricted its production to the solvent fractionation technology.

Environmental constraints, price and risk associated with the use of solvents oblige the industry to turn towards technological alternatives, like the dry fractionation process. To optimize it, the need for a profound understanding of the fundamental crystallization phenomena at the basis of the process is evident.

Applied to palm oil, dry fractionation is a multi-step process; to obtain the necessary hard palm mid fraction for CBE production, it needs to be fractionated (most of the time in three steps) to concentrate the POP (naturally present in amounts varying between 25 and 30%) to a level of between 65 and 70%.

In this work, six different soft palm mid fractions were selected for hard palm fraction production and compositional characteristics were determined; crystallization was followed under shear in a pilot scale fractionation unit and specific behaviours were pointed out. Thermal and polymorphic properties of these fractions were simultaneously investigated by differential scanning calorimetry and real time X-ray diffraction (SAXS and WAXD using synchrotron radiation) indicating a clear impact of compositional characteristics on molecular interactions taking place during the crystallization process.