Phase behavior of palm oil in blends with palm-based diacylglycerol

Abstract

Phase behavior of palm oil (PO) in blends with different concentrations (10% intervals) of palm-based diacylglycerol oil (PO-DAG) was studied using the iso-solid diagram, solid fat content (SFC) with the hardness thermal protocol, DSC melting and crystallization curves, X-ray diffraction curves, and texture analysis (hardness). Minor eutectic effects were observed at around 20–50% PO-DAG in 20–50% SFC iso-lines. The phase behavior predicted by the iso-solid diagram as well as SFC with the hardness thermal protocol did not account for hardness variations observed between PO and PO blends with 10–40% PO-DAG. Nevertheless, the latter could be attributed to the corresponding DSC data as well as crystal polymorphism. However, as the concentration of PO-DAG increased from 40% to 100%, iso-line temperatures, SFC with the hardness thermal protocol, and also hardness were found to steadily increase. PO-DAG at 10% concentration was found to have a β′-stabilizing effect on the polymorphism of PO, while a β-tending effect was observed as the concentration of PO-DAG increased from 10% to 90%.

Keyword: Palm-based diacylglycerol; Phase behavior; Crystallization; Polymorphism; Hardness