Biopolymer nanocomposite films for use in food packaging applications

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Abstract
A wider use of polylactide (PLA) in applications like food packaging requires further material development in order to achieve the necessary properties such as heat stability as well as improved mechanical and barrier characteristics. In the NANOPACK project (www.nanopack.dk), funded by the Danish Council for Strategic Research, we are investigating nano-scale reinforcement of PLA based on organomodified-clays or layered double hydroxides (LDH) in order to achieve improvements in these properties.

Results
1. Extrusion of an LDH (Hycite 713, Ciba Speciality Chemicals Inc.) – PLA (Biomer L9000) film.

2. Extrusion of an organomodified-clay (Cloisite 30B, Southern Clay Products Inc.) – PLA (Biomer L9000) film.

Conclusions
1. XRD and TEM results show good dispersion of 2% Hycite 713 LDH in PLA film; however, PLA film transparency is reduced.

2. XRD and TEM results point to an intercalated/exfoliated morphology for 2% Cloisite 30B organoclay in PLA film; however, a reduction in oxygen transmission rate through the film has not yet been demonstrated.

Future plans
• Completion of PLA processing with a range of commercial organoclays and identification of optimum films for packaging.
• Investigation of further commercial and laboratory-prepared LDHs as reinforcement in PLA films.

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