



Polymers under Multiple Constraints

Polymer- & Soft-Matter-Seminar

Tuesday,
21st November
2017

at: 5.15pm

VDP4 1.27,
Von-Danckelmann-Platz 4,
06120 Halle

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“Structure-Property Relationships of Nanocomposite based on Polylactide and Layered Double Hydroxides as Nanofiller”

Polymer-based nanocomposites attracted recently a lot of attention from both the applicative and fundamental point of research. While the former point of view is due to the properties improvement compared to the corresponding matrix polymers the latter aspect is related to interaction of polymers with solid surfaces and confinement effects.

Here, nanocomposites based on poly(L-lactide) (PLA), which is a semi-crystalline polymer, and organically modified Layered Double Hydroxides (LDH) were prepared by melt blending, and investigated by a combination of Differential Scanning Calorimetry (DSC), Small- and Wide-Angle X-ray Scattering (SAXS, WAXS), and dielectric spectroscopy (BDS). Two different LDH materials were considered, which results in different morphologies of the nanocomposites. The influence of these different morphologies on the properties of the nanocomposites especially on the molecular mobility is discussed in detail.

In general the structure of semi-crystalline polymers has to be described by a three phase model, consisting of a mobile amorphous (MAF), a crystalline (CF), and a rigid amorphous fraction (RAF). For nanocomposites based on semi-crystalline polymers the RAF is due to both the crystallites (RAF_{crystal}) and the filler (RAF_{filler}). The considered nanocomposites were further investigated by hyper and temperature modulated differential scanning calorimetry. For the first time the different phase fractions CF, MAF, RAF_{crystal}, and RAF_{filler} could be estimated independently from each other.

References:

- Leng, J.; Purohit, P.; Kang, N.; Wang, D.-Y.; Falkenhagen, J.; Emmerling, F.; Thünemann, A.; Schönhals, A.
European Polymer Journal 68 (2015) 338-354
Leng, J.; Kang, N.; Wang, D.-Y.; Falkenhagen, J.; Thünemann, A.; Schönhals, A. Macromolecular Chemistry and Physics (2017) 1700232 DOI: 10.1002/macp.201700232
Leng, J.; Kang, N.; Wang, D.-Y.; Wurm, A.; Schick, C.; Schönhals, A.
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