Degradation of l-polylactide during melt processing with layered double hydroxides - DTU Orbit (23/12/2018)

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PLA was melt compounded in small-scale batches with two forms of laurate-modified magnesium–aluminum layered double hydroxide (Mg-Al-LDH-C12), the corresponding carbonate form (Mg-Al-LDH-CO3) and a series of other additives. Various methods were then adopted to characterize the resulting compounds in an effort to gain greater insights into PLA degradation during melt processing. PLA molecular weight reduction was found to vary according to the type of LDH additive. It is considered that the degree of particle dispersion and LDH exfoliation, and hence the accessibility of the hydroxide layer surfaces and catalytically active Mg site centers are causative factors for PLA degradation. Interestingly, the release of water under the processing conditions was found to have a rather small effect on the PLA degradation. Low loadings of sodium laurate also caused PLA degradation indicating that carboxylate chain ends may be active degrading agents. Phosphate treatment of laurate-modified LDH was investigated and this may be a promising way of reducing PLA degradation, thereby making such processes more practically realistic.
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