SYNTHESIS OF PLA-PEG COPOLYMER AND ITS CHAIN EXTENDING WITH DI-ISOCYANATES. STRUCTURE, DEGRADATION AND POTENTIAL UTILIZATION.

Pavel Kucharczyk\textsuperscript{a}, Petr Stloukal\textsuperscript{a}, Marek Koutny\textsuperscript{a}, Alena Pavelkova\textsuperscript{a}, Vladimir Sedlarik\textsuperscript{a}

\textsuperscript{a} Center of Polymer Systems, Tomas Bata University in Zlín, Nam. T. G. Masaryka 5555, 76001 Zlin, Czech Republic
(p_kucharczyk@ft.utb.cz, www.cps.utb.cz.)

Introduction
Lactic acid (LA) polymer (PLA) and copolymers are recognized for their biocompatibility and biodegradability and have wide used in many fields.

In this work, poly(lactic acid)/poly(ethylene glycol) (PLA/PEG) copolymer predominantly terminated with OH groups was prepared and subsequently reacted with di-isocyanates to produce poly(ester-urethane) (PEU). The properties of the products and their potential utilization as nano fibers and nano/micro capsules were investigated.

Materials and Methods
PLA/PEG – LA was dehydrated 4 h at 160 °C, p = 20 kPa. Then, 0.4 % of Sn(Oct)\textsubscript{2} +7.5 % PEG (4000) was added. Reaction continued 24 h, 0.1 kPa.
PEU – 30g of PLA/PEG was melted (N\textsubscript{2}, 160 °C). Then, MDI (CAS 101-68-8) or HMDI (822-06-0) was added and reaction continued for 30 min.
Electro spinning –12% DMF solution on PP nonwoven substrate.
Nano particles – Formed by solvent evaporation method according to [1].

Results and discussion
In Fig. 1 (upper part) the weight average molecular weight of products are shown. It can be seen, that after addition of di-isocyanate the $M_w$ increased significantly. This was more dominant in case of HMDI, where the highest $M_w \sim 225\ 000$ kg/mol was achieved. This showed on successful reaction between chain end groups and di-isocyanate compounds. In the lower part of Fig. 1 the degradation behavior in buffered solution (pH=7.4, 37 °C) is presented. It can be seen, that the type and concentration of di-isocyanate compound play a significant role during hydrolysis. Enhanced hydrolysis was observed in case of HMDI at the lowest concentration, while MDI
Conclusions
Poly(ester urethane) based on PLA/PEG copolymer was prepared. It can be successfully utilized in nano/micro fabrication like, fibers and particles.

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References