Final Report (2012)

**63p24 - Development of effective technology for production of biodegradable polymer**

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The research is concentrated on Development of effective technology for production of biodegradable polymer. The project is planned for 2 years (2012-2013). In accordance with the first experimental period from 1. 2. 2012 - 31. 12. 2012 were completed these research steps:

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| **WP Nr./Name** | 1. Preparation of PLA-nanocomposites |
| **Time period** | 01/12-07/12 |
| **Work description** | 1. Preparation of PLA/nanofiller mixtures with different filler content and surface treatment in semi-industrial twin-screw extruder. |
| **Persons/institutions involved** | Milan Kracalik, MUL-KV  Hannelore Mattausch, MUL-KV  Alena Kalendova, TBU-FT  2 Students, TBU-FT |
| **Deliverables** | PLA/nanofiller compounds |

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| **WP Nr./Name** | 2. Preparation of PLA-nanocomposite films |
| **Time period** | 05/12-09/12 |
| **Work description** | Preparation of different PLA-nanocomposite sheets from prepared PLA/nanofiller compounds |
| **Persons/institutions involved** | Alena Kalendová, TBU-FT  2 Students, TBU-FT  Milan Kracalik, MUL-KV  Hannelore Mattausch, MUL-KV |
| **Deliverables** | PLA-nanocomposite films |

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| **WP Nr./Name** | 3. Characterization of PLA-nanocomposite properties |
| **Time period** | 04/12-12/12 |
| **Work description** | Measurement of processing as well as utility properties for compounds and film prepared in 1th and 2nd workpackages 2012:   * Rheology * DSC * Gel permeation chromatography (GPC) * Biodegradability started 11/2012 * Permeability started 12/2012 |
| **Persons/institutions involved** | Alena Kalendova, TBU-FT  Marek Koutny, TBU-FT  2 Students, TBU-FT  Milan Kracalik, MUL-KV  Hannelore Mattausch, MUL-KV |
| **Deliverables** | Data of biodegradability and other material specifications of  selected samples |

*The resources of the project supported following visits of PhD, Master students and academic staff from Tomas Bata University in Zlin (TBU-FT) in Montanuniversitaet Leoben (MUL-KV):*

2. 4. - 30. 4. 2012 Petr Stloukal – the Ph.D. student, started with preparation of nanocomposites samples of biodegradable polymer poly(lactic acid) with the help of twin screw extruder. Subsequently, he measured the flow properties and characteristics with the use of a rotational rheometer, and carried out the melt tensile tests.

14. 5. – 22. 5. 2012 Veronika Koudelníčková – the Master student, helps with the rheological measurement and evaluation. Miss Koudelníčková also enlarged her knowledge about nanocomposite compounding.

20. 8 - 28. 8. 2012 Alena Kalendová, Ph.D. – academic staff, detailed acquaints with the cooperation partner institution and team partners. The meeting about he XRD measurement were realized with Dr. Guenther Maier. Next 3 samples were tested for rheological properties, evaluation of measured reological datas. Futher the finished experiments and next step of cooperation was discussed. Also the stay of miss Safarikova was planned, who obtained individual fellowship from DZS.

20. 8. – 24. 8. 2012 Marek Koutný, Ph.D – academic staff, detailed acquaints with the cooperation partner institution and team partners. The meeting about he XRD measurement were realized with Dr. Guenther Maier. Next step of cooperation was discussed focusing to the biodegradability tests.

28. 10. – 31. 10. 2012 Marek Koutný, Ph.D – academic staff, lecture: Biodegradable polymers (mechanisms biodegradability, testing of biodegradability). Mr. Koutný have to divided his stay into two periods, because during the first stay in august it was not possible to give the lecture for the students. He was not ask for the travel costs from the project for the second journey.

28. 10. – 2. 11. 2012 Alena Kalendová, Ph.D. – academic staff, discussion about the work package 2013 and preparing the project documentation for the next year (2013) together with MUL-KV projectpartner. Next the lecture: Polymer/Clay nanocomposites (production, fillers, properties).

*Supported visits of PhD student and academic staff from Montanuniversitaet Leoben (MUL-KV) in Tomas Bata University in Zlin (TBU-FT):*

7. 5. – 13. 5. 2012 Ing. Milan Kráčalík, Ph.D. – first test of PLA/nanocomposite sheets extrusion and lecture: Advanced compounding of polymer nanocomposites. Mr. M. Kracalik left the MUL-KV in august 2012, therefore he was realized only one stay in TBU-FT. The contacts with Mr. Kracalik continue. At MUL-KV he was substituted by ass. prof. Stephan Laske, who is included to the next year project proposals.

5. 11. – 10. 11. 2012 Hannelore Mattausch – Ph.D. Student, detailed acquaints with the cooperation partner institution. Analysis of small angle X-ray scattering of PLA nanocomposites.

All the main goals of the project for year 2012 have been achieved. The schedule for the next year 2013 is ready and some experiments are in progress. In next year should be ready the outputs of project like articles and Master thesis. The project may be evaluated as very successful, from the viepoint of link-up of new contacts and future cooperation in some international project.