

BOOK of ABSTRACTS

25th Congress of Chemists and Technologists of Macedonia



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Сојуз на хемичарите и технолозите на Македонија

Society of Chemists and Technologists of Macedonia

**25th Congress of SCTM
with international participation**

BOOK of ABSTRACTS

**19–22 September 2018
Metropol Lake Resort
Ohrid, R. Macedonia**



Сојуз на хемичарите и технолозите на Македонија
Society of Chemists and Technologists of Macedonia

19–22 September 2018, Metropol Lake Resort, Ohrid

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The 25th Congress of SCTM is a



recognized event.

Dear Colleagues,

Welcome to the 25th Congress of the Society of Chemists and Technologists of Macedonia. Although this is our silver jubilee, our society is celebrating more than 50 years of scientific meetings. The first conference, one of the first activities of our society, was organized in the 1960-ties and was a meeting between the faculties of the Institute of Chemistry at Faculty of Sciences and Mathematics and the Faculty of Technologists, both at the Ss. Cyril and Methodius University in Skopje. They gradually grew into biennial meetings and attracted participants outside of Macedonia. Beginning from the 18th Congress in 2004 all our meetings are held in the exceptional setting of Lake Ohrid. In 1994 our society started to organize students' scientific meetings and now the two alternate, so there is a congress organized by our society every year.

Since 2012 we have been using the Open Journal System to manage the editorial process of the [*Macedonian Journal of Chemistry and Chemical Engineering*](#) published by our society. In order to streamline the technical management of this congress and future such meetings, we have undertaken for the first time to implement the Open Conference System. You are all now familiar with the whole process of registering, submitting the abstracts etc. – at times you/we did encounter problems but overall we are satisfied with this platform and plan to use it in the future. For all of you who have smart phones, you will find the abstracts and schedule online which can be searched by various criteria. Furthermore, in line with the digital age we live in, for the first time we will not have a printed Book of Abstracts but only an electronic one. A draft version with all submitted abstracts along with the conference program was uploaded to the platform three weeks ago. The final version will be available after the conference and only the presented contributions will be included. Another first at this conference will be a Skype presentation on Saturday. We hope in the future to further improve the technical capabilities by streaming at least some of the lectures online.

Next year the world will be celebrating 150 years of Mendeleev's Periodic table of the chemical elements. Our society was involved from the very beginning two years ago – we immediately contacted our representative to UNESCO to give our full support for this important event marking one of the few discoveries in science that has withstood such a long test of time. It is nice to see the world united in a scientific achievement despite the extreme polarization in other areas. I believe you share my opinion that we are so fortunate to have chosen to pursue chemistry, the ever evolving science. Whenever I hear divisive undignified debates that take place so often now, the words of Sir Humphrey Davy in his discourse delivered at the Royal Society, in November 1825 echo in my ears: *Fortunately science, like that nature to which it belongs, is neither limited by time nor by space. It belongs to the world, and is of no country and of no age. The more we know, the more we feel our ignorance; the more we feel how much remains unknown; and in philosophy, the sentiment of the Macedonian hero can never apply, – there are always new worlds to conquer.*

From the more than 250 contributions given in this book we have a truly diverse body of researchers in many fields of chemistry. But more important than the number is the quality of the scientists presenting their new results: we have two exceptional keynote speakers, 10 invited speakers, 49 oral presentations and 195 poster presentations. Due to the traditional environment of tolerance in Macedonia, it is a truly unique regional conference bringing together the scientists from a very wide area.

I would like to thank sincerely the presidents of the Organizing and Scientific Committees, Prof. Viktor Stefov and Prof. Trajče Stafilov. Also, I must mention Assistant Prof. Jasmina Petreska-Stanoeva and Prof. Marina Stefova. I think this is the best team we could put together to make a really flawless organization. Furthermore, I would like to thank the Ministry of Education and Science of Macedonia, the Ss. Cyril and Methodius University in Skopje and the Goce Delčev University in Štip for their financial support, as well as the commercial sponsors that are given at the end of this book for their financial support and/or support in their products.

I do hope you will enjoy the scientific program of this congress, the interactions with colleagues from other institutions and countries and will build new relationships and collaborations. Most of all I would like to ask you to spend some time with the young researchers and students present here – for one of our main goals is also to build on the nexus between education and research and inspire and energize the young in the intricacies of the science of chemistry. I know I do not need to tell you to enjoy this magnificent lake, for us the most beautiful lake in the world, the inspirational crammed with extraordinary churches city of Ohrid and its unique heritage to world civilization.

Prof. Zoran Zdravkovski, president
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POL P-21

**ISOTHERMAL CRYSTALLIZATION OF ISOTACTIC POLYPROPYLENE
NUCLEATED WITH PIMELATES OF EARTH-ALKALINE ELEMENTS**

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Ba, Sr, Ca and Mg pimelates were used as nucleators for the crystallization of isotactic polypropylene. The pimelates were synthesized as described earlier [1] and they were obtained as white powders. Their average grain size and distribution were determined, and for Ca- and Ba-pimelates the grain size was less than 10 micrones, while larger dimensions were found for Mg- and Sr-pimelates (29 and 22 micrones). Isothermal crystallization of polypropylene was analyzed by DSC. The crystallization was carried out at the T_c in the range from 397K to 406 K. Based on the determined values for the enthalpy of crystallization, the extent of crystallization (crystal conversion) was calculated and the half-time of crystallization ($t_{0.5}$) was determined and used as a parameter to compare the rate of crystallization in differently nucleated systems. It was shown that the value of $t_{0.5}$ for Ca-pimelate nucleated polypropylene was lower than for all other nucleated systems. The content of the β -crystalline phase in polypropylene nucleated with different pimelates has a decreasing tendency with the increasing of crystallization temperature, T_c . The equilibrium melting temperature for the nucleated polypropylene was in the range $T_m^0=446-455$ K, lower than for non-nucleated isotactic polypropylene (460 K).

References:

[1] Janevski, A; Bogoeva-Gaceva, G.; Stefov, V.; Najdoski, M. The correlation between structure and β -nucleation efficiency of Ba, Sr, Ca and Mg pimelates in isotactic polypropylene *Maced. J. Chem. Chem. Eng.* **2015**, 34, 189-199

Keywords: polypropylene, pimelates, polypropylene.

ISOTHERMAL CRYSTALLIZATION OF ISOTACTIC POLYPROPYLENE NUCLEATED WITH PIMELATES OF EARTH-ALKALINE ELEMENTS

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Introduction

Isotactic polypropylene (iPP) is one of the most important commodity thermoplastics widely used in many areas because of its versatility, good physical and mechanical properties, recyclability and low cost. iPP has been studied extensively for its polymorphic characteristics and crystallization behavior, since the formation of specific crystalline form (α , β , γ or smectic) can affect the macroscopic behavior quite dramatically. The trigonal β -form is metastable and can be obtained or can become predominant under specific crystallization conditions or in the presence of β -nucleating agents.

Objective

The aim of this work is: (i) to analyze the crystallization of iPP nucleated with Ba, Sr, Ca and Mg pimelates; (ii) to determine the content of beta crystalline phase, and (iii) to evaluate the parameters of crystallization.

Experimental and materials

Magnesium, calcium, strontium, and barium salts of pimelic acid were synthesized by reaction of 50 % (m/m) of pimelic acid and carbonates of magnesium, calcium, strontium and barium (Merck).

β -nucleated iPP was obtained by mixing 0.1 %wt. pimelates with iPP in Brabender PL 2000 at 460 K. The isothermal crystallization of nucleated iPP was analyzed by DSC. The sample was rapidly heated to 478 K and held in the molten state for 5 min, to erase the thermal history of the polymer. The crystallization was carried out at the T_c in the range from 397K to 406 K.

References

[1] Janevski, A.; Bogoeva-Gaceva, G.; Stefov, V.; Najdoski, M. The correlation between structure and β -nucleation efficiency of Ba, Sr, Ca and Mg pimelates in isotactic polypropylene. *Maced. J. Chem. Chem. Eng.* **2015**, *34*, 189-199

[2] Janevski, A.; Bogoeva-Gaceva, The influence of glass fibers on the morphology of β -nucleated isotactic polypropylene evaluated by differential scanning calorimetry. *J. Serb. Chem. Soc.* **2015**, *80*, 223-235

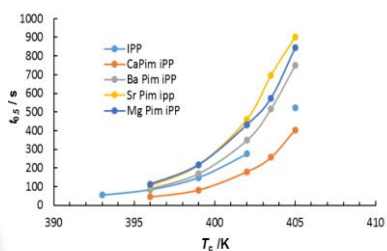


Figure 2.

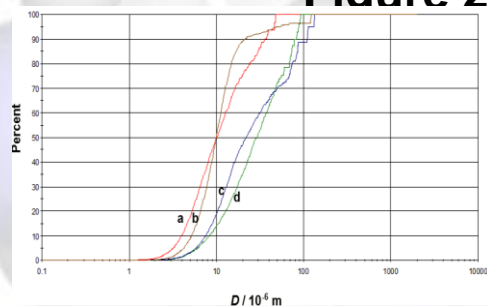


Figure 1. Dimensions distribution curves of : a) Ca pimelate, b) Bapimelate, Sr pimelate and d) Mg pimelate.

Table I. Volume based particle size distribution

Sample	$D[V, 0.1]/\mu\text{m}$	$D[V, 0.5]/\mu\text{m}$	$D[V, 0.9]/\mu\text{m}$
Mg pimelate	8	29	83
Ca pimelate	4	10	36
Sr pimelate	8	22	110
Ba pimelate	5	10	21

$D[V, 0.1]/\mu\text{m}$ – 10% of the particles are below the stated value
 $D[V, 0.5]/\mu\text{m}$ – 50% of the particles are below the stated value
 $D[V, 0.9]/\mu\text{m}$ – 90% of the particles are below the stated value

Influence of half-

crystallization

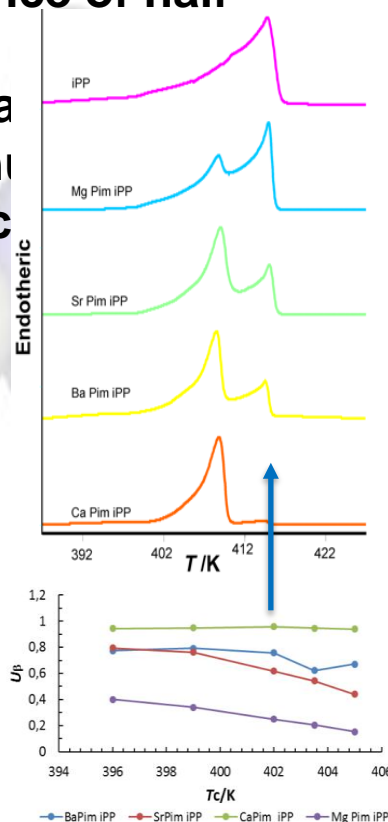


Figure 6. DSC melting thermograms of iPP nucleated by pimelates of earth alkaline elements after isothermal crystallization at different temperatures and the relative content of β -phase (U_β).

Conclusions

- The value of $t_{0.5}$ for Ca-pimelate nucleated polypropylene was lower than for all other nucleated systems.
- The content of the β -crystalline phase in polypropylene nucleated with different pimelates has a decreasing tendency with the increasing of crystallization temperature, T_c .
- The equilibrium melting temperature for the nucleated polypropylene was in the range $T_m^0 = 446-455$ K, lower than for non-nucleated isotactic polypropylene (460 K).



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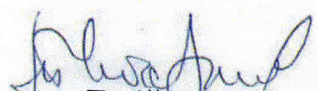
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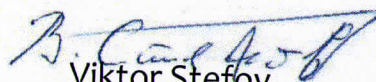
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**ISOTHERMAL CRYSTALLIZATION OF ISOTACTIC POLYPROPYLENE NUCLEATED WITH PIMELATES
OF EARTH-ALKALINE ELEMENTS (POL, P-21)**

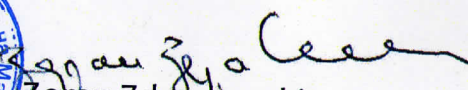

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