

4th International Caucasian Symposium  
on Polymers and Advanced Materials

ICSP & AM4

Batumi  
2015

# Welcome

Dear Colleagues,

On behalf of the Organizing Committee I wish to extend cordial welcome to all participants of the 4<sup>th</sup> International Caucasian Symposium on Polymers and Advanced Materials. eight years ago, 2007, this symposium took place in Tbilisi, Georgia. We are delighted to host you in this year in very beautiful seaside city on the Black Sea coast and capital of Adjara, anautonomous republic in southwest Georgia.

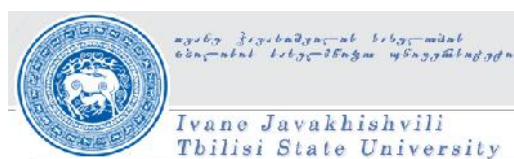
This year is significant for the Shota Rustaveli Batumi State University. He celebrated his 80th anniversary of its founding. This year also marks the 165 year anniversary of the first rector of Iv. Javakhishvili Tbilisi State University Peter Melikishvili

The purpose of the conference is to encourage scientists working in polymer chemistry and advanced materials to present their investigations dedicated to problems and discoveries in above mentioned fields. Also “ICSP&AM 4” will help to introduce effectively innovative scientific researches of Georgian, Caucasian and neighboring scientific teams, which are less known for world scientific society.

We hope that this year meeting, gathering almost 100 participants, shall provide a good platform for academic and industrial scientists to discuss recent advances in the area of polymers and advanced materials.

Professor Omar Mukbaniani

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## Abstract

### DEVELOPMENT OF MODIFIED SELF-EXTINGUISHING EPOXY-AMINE POLYMERS

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Sphere expansion of application and increase of the requirements put forward to quality of epoxy polymeric products cause necessity of new paths searching of obtaining polymeric materials of the moderate combustibility. The solution of this problem is related with development of physicochemical methods of modifying compositions on the basis of epoxy resin. In this respect way of the including into a polymeric matrix of low-molecular chemical substances with considerable reactivity has tremendous perspective. Results of development of new self-extinguishing epoxy-amine compositions destined for production of the protective surfaces, glue, encapsulation materials, compounds, mastics, premixes *etc.* are presented in this work. Base for development of such compositions were epoxy-amine resins with different molecular weight ( D-16, D-20, D-22) and amino hardener – polyethylenepolyamine. The salts of various *d*-metals have been used by us as the perspective materials for combustibility decrease of epoxy-amine compositions [1, 2]. The cause of high ability of *d*-metals salts to depress combustibility of epoxy-amine compositions consist in chemical interlinking of combustible nitrogen-containing molecules of a hardener with metal atoms of noncombustible inorganic salt and, at the same time, forming very strong coordinating bonds. The influence of a whole sequence of measurements (quantity of modifier and hardener, technological regime of obtaining and hardening of resins) onto properties of the composites has been investigated. Results of experiment have revealed that combustible properties of epoxy-amine polymers at addition even the small quantity of *d*-metal salt is appreciably lowered in comparison with unmodified composite. So, the values of ignition points and self-ignition points, burning rate as much as smoke-formation factors are much less for the modified composites than for unmodified composites.

It is typical that in case of modified epoxy polymers the decrease of their combustibility is accompanied by concurrent improvement of operational properties of such materials. In particular, adding to an epoxy resin of *d*-metal salt possessing variable valence improves plasticity of the modified polymers. The modified polymers in comparison with usual samples are characterized by increased impact strength: under impact of slog the fastness value of a covered film increases in 2-3 times and the surface hardness in turn decreases in 2-3 times. The analysis of measurement results of adherence fastness of coatings for the filled epoxy resins with the various content of inorganic salt has revealed that incorporation into an epoxy composite of some amount of salt considerably improves adherence properties of such coatings. Filling of epoxy polymers by *d*-metals salts also depresses their sorption ability in water, solutions of alkalis and acids. Thus owing to the carried out work we have composed mixture and chosen the optimum technological mode of the production of self-extinguishing epoxy-amine polymers

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