

This article was downloaded by:

On: 19 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



International Journal of Polymeric Materials

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713647664>

Fire and Polymers

G. E. Zaikov^a; M. I. Artsis^a

^a Russian Academy of Sciences, Institute of Chemical Physics, Moscow, Russia

To cite this Article Zaikov, G. E. and Artsis, M. I.(1995) 'Fire and Polymers', International Journal of Polymeric Materials, 29: 3, 197 – 199

To link to this Article: DOI: 10.1080/00914039508012113

URL: <http://dx.doi.org/10.1080/00914039508012113>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Fire and Polymers

G. E. ZAIKOV and M. I. ARTSIS

*Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin str.,
117334 Moscow, Russia*

(Received December 6, 1994)

“Fire and Polymers” is the title of section C of division of polymeric materials: science and engineering (PMSE) in 208 American Chemical Society National Meeting and Exposition which were held in Washington, DC in the period of August 21–25, 1994. More than 17000 scientists from USA and many other countries took part in this conference. It was 6000 reports from different countries. All participants were divided on 17 divisions and every division divided on 3–7 sections. In this paper we will speak only about section C, PMSE division where authors took part as speakers and participants.

During August 21–23, 1994 it was 5 sessions of this section with 35 reports; about 200 scientists from USA, Israel, Sweden, Japan, South Korea, China, Taiwan, England and Russia. Three main topics were discussed on this section:

1. Flammability of polymeric and composite materials, reduction of flammability. New Approaches
2. Testing and Modeling
3. Combustion and Toxicity

Dr. Gordon Nelson (Florida Institute of Technology, Melbourne, FL)—former president of American Chemical Society was organizer of this program. Scientist from National Institute of Standards and Technology (Gaithersburg, Maryland) gave 5 reports at this meeting. Drs. J. W. Gilman, T. Kashiwagi and D. L. Vander-Hart spoke about thermal decomposition chemistry of poly (vinyl alcohol) and char characterization, Drs. T. J. Ohleman and T. G. Cleary gave information about upward flame spread on composite materials, Drs. D. M. N. Knauss and T. Kashiwagi discussed problems of flammability of copolycarbonates containing hydrolytically stable phosphine oxide comonomers, Drs. M. R. Nyden, J. E. Brown and S. M. Lomakin† gave presentation about flammability properties of nomex honey comb and phenol-formaldehyde resins and report of Drs. I-Y. Wan, T. Kashiwagi

†S. M. Lomakin is inviting researcher from Institute of Chemical Physics, Russian Academy of Sciences, Moscow, Russia.

and J. E. Grath‡ was devoted to problems of synthesis, characterization and flame retardancy behavior of triaryl phosphine oxide containing nylon 6,6-copolymer.

Very important and interesting reports were presented by group of researchers of Polymer Research Institute from Brooklyn Polytechnic University (New York). With great attention participants attended and discussed review of Prof. Eli M. Pearce (director of Polymer Research Institute) about crosslinking and char formation. Prof. Edward D. Weil and Dr. W. Zhu were speaking about some practical and theoretical aspects of using of melamine as a flame retardant, and Prof. Menachem Lewin and Dr. Enoko presented information about intumescent systems for flame retardancy of polypropylene.

Prof. Charles A. Wilkie from Marquette University (Milwaukee, WI) gave two very important talks. The first one was concerned surface modification of polymers to achieve flame retardancy (with coauthors X. Dong and M. Suzuki§) and second one was dedicated to effect of some tin additives on the thermal degradation of poly (methylmethacrylate) (with Dr. J. A. Chandrasiri).

Prof. W. H. Starnes Jr. (one from the most important scientists in the field of polyvinylchloride over the world) from College of William and Mary (Williamsburg, VA) gave very interesting talk about copper-promoted reductive coupling as a potential means of smoke suppression in poly(vinylchloride).¶ Problems of studies of thermal degradation and flame retardancy of EVA, PE/P_x and melamine condensates by XPS/TGA were discussed in report of Prof. J. Q. Wang (Beijing Institute of Technology, China). Prof. Guennadii E. Zaikov from Institute of Chemical Physics Russian Academy of Sciences (Moscow) gave report about new types of ecologically safe flame retardant (coauthor S. M. Lomakin). In this report has been shown new ecologically-safe class of polymer flame retardants based on the polymer blend of different thermoplastics and polyvinyl alcohol. Some group of low-hazard flame retardant system based on the Si and the chlorides of metals (Sn, Cu, Ca etc).

Very important information was given by Dr. Gordon Nelson about effect of siloxane segregation on the fire performance of silicone polyurethanes (coauthor is Dr. R. Benrashid). Linear siloxane polymers as precursors to high-temperature materials were discussed in the talk of Drs. D. Y. Son and T. M. Keller from Naval Research Lab. (Washington, DC). Second report of Dr. Keller was devoted of high-temperature copolymer from inorganic-organic hybrid polymer and multiethylbenzene. It is necessary to remind about very informative talk of Dr. R. E. Lyon (US Department of Transportation, Federal Aviation Administration, Atlantic City, New Jersey) about fire-safe air-craft materials, Dr. Ronald L. Markezich (Occidental Chemical Corp., Grand Island, New York) spoke about using of a chlorinated flame retardant in combination with other flame retardants (coauthor is Dr. D. G. Aschbacher). Dr. E. C. Coad's report (University of Michigan, Ann Arbor) was devoted to synthesis and characterization of novel carbon nitrogen materials by thermolysis of monomers and dimers of 4,5-dicyanoimidazole (coauthor is P. G. Rasmussen). Two last reports from this group of talks were concerned

‡J. E. Mac Grath is from Virginia Polytecnic, Blacksburg, VA.

§Dr. M. Suzuki is from Japan Rubber Co., Osaka.

¶Coauthors are J. P. Jang, S. A. Tarranova, E. Bonaplata, K. Goldsmith and D. Willi.

problems of thermal analysis of fire retardant poly(vinylchloride) using pyrolysis-chemical ionization mass spectrometry (S. C. Israel, S. Shah, V. Davé, University of Massachusetts Lowell, Lowell, MA) and aromatic organic phosphates oligomers as flame retardants in plastics (R. D. Deanin and M. Ali, University of Massachusetts, Amherst, MA).

The first report in group "Testing and Modeling" was done by Dr. Marcelo M. Hirschler (Safety Engineering Laboratories, Rocky River, Ohio) about tools available to predict full-scale fire performance of furniture. Dr. M. R. Christy from Dow Chemical Co. spoke about controlled-atmosphere cone calorimeter as a method of studying of flammability. Report of Dr. Mark L. Janssens (American Forest and Paper Association, Washington, DC) was concerned roomfire, in particular a compartment fire model shell. Protocol for ignitability, lateral flame spread, and heat release rate using lift apparatus was discussed by Dr. Mark A. Dietenberger (USDA Forest Products Laboratories, Madison, WI). There was a big discussion and after discussion there were a lot of questions to Dr. B. Sundstrom from Swedish National Testing Institute (Stockholm) after his talk about testing upholstered furniture in Europe (overview of activities and description of a specific project, CBUF).

The group of reports about combustion and toxicity included 7 reports: Dr. M. L. Hardy (Chem. Manuf. Assn.) about status of regulation affecting brominated flame retardants in Europe and the USA, Dr. B. C. Levin (National Institute of Standards and Technology, Gaithersburg, MD) about new approach for predicting the toxic potency of complex combustion mixtures, Drs. D. J. Caldwell and K. J. Kuhlmann (University of Utah) about smoke production from advanced composite materials, Drs. M. L. Smith, J. J. Kuhlman Jr. and V. F. Kalasinsky about investigation of exposures to fire toxins, Drs. F. W. Stemler, A. Kaminskis, T. M. Tezak-Reid, R. R. Stotts, T. S. Moran, H. Hurt Jr. and N. W. Ahle (Research Institute of US Army, Aberdeen, Maryland) about correlation of atmospheric and inhaled blood cyanide levels in miniature pigs, Drs. M. A. Mayorga, A. J. Januskiewicz and B. E. Lehnert (Research Institute of US Army) about environmental nitrogen dioxide exposure hazards of concern to the US Army and Drs. G. D. Ritchie and J. Rossi III (Geo Cus Inc.) about Neurobehavioral battery for the analysis of acute exposures to toxic atmospheres.

The conference showed that problem of flammability of polymeric and composite materials is still very important from the point of view of theory as well as from point of view of practice because these materials are used more and more in many fields.