

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>

Fourth Meeting on Fire Retardant Polymers

G. E. Zaikov^a

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

To cite this Article Zaikov, G. E.(1993) 'Fourth Meeting on Fire Retardant Polymers', International Journal of Polymeric Materials, 21: 3, 211 – 214

To link to this Article: DOI: 10.1080/00914039308012049

URL: <http://dx.doi.org/10.1080/00914039308012049>

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.

Fourth Meeting on Fire Retardant Polymers

G. E. ZAIKOV

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

The Fourth Meeting on Fire Retardant Polymers was held from September 9 to 11, 1992 in Albert-Ludwigs-University of Freiburg (Germany) by the Freiburg Materials Research Center (F.M.F). Close collaboration was provided by the University of Torino, Department of Chemistry, IPM, Torino (Italy), Universite Louis Pasteur and Ecole d'Application des Hauts Polymers-EAHP, Strasbourg (France), and the University of Kaiserslautern (Germany) with support from the European Polymer Federation (EPF) and the Groupe Francais des Polymers (GPF). The Organizing Committee included Chairman R. Mülhaupt (Germany), G. Camino (Italy), W. Becker (Germany), J. Brossas (France) and L. Costa (Italy).

The Scientific Committee included W. Becker (BASF AG, Germany), G. Camino (University of Torino), P. Flury (Ciba-Geigy AG, Switzerland), I. C. McNeill (University of Glasgow, UK), R. Mülhaupt (University of Freiburg, Germany), J. Otton (Rhone-Poulenc, France), J.-C. Robinet (Norsolor, France), J. Troitzsch (Wiesbaden, Germany), J. Brossas (EAHP, Strasbourg), L. Costa (University of Torino), R. Locatelli (Himont, Ferrara, Italy), C. Moye (Centre Scientifique et Technique du Batiment, Mame-la-Valle, France), S. Russo (University of Sassart, Italy), A. Sainrat (Lab. Nat. d'Essais, Paris, France), and D. Woolley (Fire Research Station, Borehamwood, UK).

The meeting was attended by scientists from 17 countries: Germany, Italy, France, Switzerland, the United States, Great Britain, Belgium, Holland, Russia, Belorussia, Austria, Czecho-Slovakia, the People's Republic of China, Poland, Yugoslavia, Croatia, and Finland.

In total, there were 160 participants from 50 organizations of various research centers of companies and academies of sciences, and from universities and institutes belonging to higher education and applied ministries.

The meeting included 30 plenary lectures and 23 poster sessions. The majority of the delegation from the former Soviet Union could not attend because of financial constraints. For this reason two plenary lectures and seven poster sessions were canceled.

Following opening remarks by the Organizing Committee Chairman Prof. Rolf Mülhaupt and committee member Prof. J. Brossas, the first lecture was delivered by Ian Cameron McNeill (University of Glasgow, Scotland) and addressed the relationship between the thermal degradation and flammability of polymers. It was an introduction to problems of flammability and flame retardance. The next lecture,

by Prof. Guennadii E. Zaikov (Institute of Chemical Physics of the Russian Academy of Sciences, Moscow), dealt with some aspects of polymer pyrolysis and included problems of kinetics and mechanisms of pyrolysis, formation of charcoal, and mechanisms of retardation of polymer combustion.

After a discussion of these two lectures, the first poster session, along with oral introductions, was organized. This session of twelve posters included as topics the photooxidation of flame retardant polymers (B. Ceric and E. Simon, University of Maribor, Maribor, Yugoslavia); nitrogen-based flame retardants for nitrogen containing polymers (H. Horachek and W. Grabner, ÖMV Chemie, Linz, Austria); copolymers of brominated phenylmaleimides with intrinsically reduced flammability (Z. Janovic, University of Technology, Zagreb, Croatia); Novel Fire Retardant unsaturated polyester resin (E. Kicko-Walczak and P. Penczek, Industrial Chemistry Research Institute, Warsaw, Poland); synthesis and self-extinguishing properties of copolymer styrene-Co-N-(1-Acetoxy-2,2,2-Trichloroethyl)Maleimide (G. Mirkiewicz and R. T. Sikorski, Technical University of Warsaw, Poland); fire retardant textile-wood board (A. Oswald and R. Réh, University of Forestry and Wood Technology, Zvolen, Czecho-Slovakia); the thermal susceptibility of poly(chloroethyl methacrylates) (I. G. Popovic, L. Katsikas, J. S. Velickovic, and W. Schnabel, Faculty of Technology and Metallurgy, Belgrade University, Belgrade, Yugoslavia); synthesis and application of polymer flame retardants (Yuzhong Wang, Yanshi Xia, and Shaji Luo, China Flame Retardant Society, Shagdong College of Textile Engineering, Qingdao, China); use of fluorinated additives in the fire retardance of polymers (P. Roma and M. P. Luda, ECP Enichem Polimeri, Ferrara, Italy); Flame-Resistance of polyetherimides and polyethernaphtylimides (A. L. Rusanov, B. B. Serkov, G. V. Kazakova, E. G. Bulycheva, K. T. Dzhashiashvili, and T. M. Kolosova, Institute of Organo-Element Compounds, Moscow); mechanisms of fire retardance in glass fiber polymer composites (A. Casu, G. Camino, M. P. Luda, ISRIM, Terni, Italy); and pibiflex: a new class of thermoplastic copolyester elastomers (P. Maltoni, A. Chiolle and S. Padovan, ECP EniChem Polimeri S.r.l., Research Center, Ferrara, Italy).

The next plenary session included ten reports. The lecture of Dr. A. B. Boscoletto (with co-authors M. Checchin, L. Milan, G. Camino, L. Costa, and M. P. Luda from Centro Ricerche Montedipe, Porto-Marghera-Venezia, Italy) dealt with surface and bulk characterization of fire retardant poly(phenylene ether)-high impact polystyrene in the UL-94 test. Flame retardant Chemical Mechanisms at FR-Viscose fibers and blends with polyester were discussed by Drs. P. Nousiainen and S. Heidari from Kemira Fibers (Valkeakoski, Finland) and invariant values of kinetic parameters-evaluation of fire retardancy applied to the PP-APP/PER System was discussed by Dr. J.-M. Leroy (co-authors R. Delobel, S. Bourbigot, M. Le Bras, Y. Schmidt, Ecole Nationale Supérieure de Chimie de Lille, Villeneuve d'Ascq, France).

A very important report was given by Prof. G. Camino (Dipartimento di Chimica, Torino University, Italy). He spoke about mechanistic aspects of intumescent fire retardant systems. The lecture of Drs. F. R. Sale and A. P. Taylor from Manchester University (Material Science Center, Manchester, UK) dealt with thermo-analytical studies of intumescent systems, and the report of Dr. S. V. Levchik from

Belorussian University (Institute of Physico-Chemical Problems, Minsk, Belorussia) prepared together with Profs. L. Costa and G. Camino (Torino University, Italy) dealt with the effect of ammonium polyphosphate on the combustion and thermal degradation of aliphatic polyamides. The potential application and the prospect of X-Ray Photoelectron Spectroscopy (XPS, or ESCA) to the fire retardance mechanism of polymers was discussed by Prof. J. Q. Wang from the Beijing Institute of Technology (Beijing, the People's Republic of China). A group of authors (G. Bertelli, R. Benassi, R. Marchini, G. Camino, L. Costa, M. P. Luda from the Dipartimento di Chimica Inorganica, Chimica Fisica e Chimica dei Materiali, Torino University, Torino, Italy) gave information about the use of thermographic techniques in evaluating polymer combustion and fire retardant performance. Dr. G. M. Anthony (FMC, Manchester, England) spoke in his report about the chemistry of smoke suppression in polyurethane foams using TGA-IR Residue Analysis. Chemical and physical properties of foamed cokes and their effect on inflammability were discussed by Dr. E. V. Gnedin (with co-author Dr. S. H. Novikov) from Karpov Research Institute, Moscow, Russia. The current status and future trends of flame retardant polymers were analyzed in the lecture of Prof. J. Troitzsch from Fire Protection Service, Wiesbaden, Germany, and fire retardancy in polyamide 6,6 plastics: additives and their mechanisms of action were discussed by Dr. S. Bodrero (co-authors Y. Adhot, J. Bonin, M. Gray, and J. Otton) from Rhone-Poulenc Recherches, Saint-Fons, France.

A very important report about the synthesis and fire retardant properties of vinyl polymers bearing phosphorous groups was given by Dr. J. M. Catala and Prof. J. Brossas (Institute Charles Sadron/CRM, Strasbourg, France).

The second poster session included twelve reports, concerning: mechanism of fire retardance in poly(2,6-dimethyl 1,4-phenylene ether)-high impact polystyrene (M. Checchin, A. Boscolo Boscoletto, G. Camino, M. P. Luda, L. Costa, Centro Ricerche Montedipe, Porto-Marghera-Venezia, Italy); tin compounds as fire retardants (P. J. Haines, School of Applied Chemistry, Kingston-upon-Thames, England); the cone calorimeter (P. A. Atkinson, London University, England); factors affecting the burning behavior of combustion-modified high resilience polyurethane foams (A. R. Horrocks, D. Price, N. L. Edwards, School of Textile Studies, Bolton, England); new flame retardant hips and nylon formulations (R. L. Markezich, Occidental Chemical Corp., Grand Island, NE, USA); investigation of the mechanisms underlying the influence of flame retardants on cotton(cellulose) pyrolysis in air (D. Price, G. V. Coleman, A. A. Farooq, A. R. Horrocks, University of Salford, England); structure versus thermal and fire-resistance properties of poly-maleimides by the thermovision method (R. T. Sikorski, Technical University of Wroclaw, Poland); the relation between the inflammability of the compositions and the thermo-physical properties of the foamed cokes (E. V. Gnedin, S. N. Novikov, Karpov Research Institute, Moscow, Russia); the flammability of macrocyclic polymers and their complexes with metals (R. M. Aseeva, G. E. Zaikov, Institute of Chemical Physics, Moscow, Russia); standardized methods of testing flammability of plastics (O. Horak, Research Institute for Synthetic Resins and Lacquers, Pardubice, Czecho-slovakia); and flame retardant polymeric additives for polyolefins (G. Audisio, CNR-Ist. Chimica Macromolecole, Milano, Italy).

The next plenary session included ten lectures. Dr. D. Kunz (Bakelite GmbH, Duisburg, Germany) reviewed the research which has been carried out in Bakelete's research center on flame retarding materials for advanced composites. The report made by Drs. H. Schreiber and W. Saur (Gurit-Essex AG, Freienbach, Switzerland) was devoted to new fire retardant, halogen-free polymers. A way to halogen-free, flame retardant laminates for electronics applications was discussed in the lecture of Dr. W. Rogler (co-authors W. von Gentzkov, J. Huber, and O. Wilhelm) from Siemens AG, Erlangen, Germany. Dr. R. N. Rothon from ICI Chemicals & Polymers, Runcorn, Cheshire, UK, gave information about particle size effects on the performance of PMMA filled with aluminium hydroxide in a variety of fire tests.

Extensive discussion and great interest followed the report of Prof. A. L. Rusanov from the Institute of Organo-Element Compounds, Moscow, Russia (with co-authors B. B. Serkov, E. G. Bulycheva, T. M. Kolosova, and I. I. Ponomarev) about flame-resistant polynaphthylene-benzimidazoles. Dr. C. D. Smith (co-author: Dr. J. E. McGrath) from Virginia Polytechnic Institute, Blacksburg, VA, USA, spoke about hydrolytically stable thermoplastic and thermosetting poly(arylene phosphine oxide) material systems. Basic polymer material properties for flame spread were discussed by Dr. M. A. Delichatsios, Factory Mutual Res., Lexington, KY, USA. The lecture of J. R. Rychly with co-authors A. Bussi, L. Rychlá (Polymer Institute, Bratislava, Czechoslovakia) discussed practical aspects of modeling of ignition and burning of organic polymers. Drs. K. Müller and Dobbernack (Kernforschungszentrum, Karlsruhe, Germany) gave information about integral fire tests with oil and cable in a nuclear power plant. The lecture of Dr. Kettrup (co-authors G. Matuschel and K. H. Ohrbach, Freiburg University, Germany, was devoted to pyrolysis of flame retardants and fire-protected polymers.

The last plenary session included five lectures. The first lecture discussed how the standards for fire retardants and fire safety reflect reality (Prof. W. Becker, BASF AG, AWETA Brandschutztechnik, Ludwigshafen, Germany). The second lecture discussed whether the safety of future fire retardant polymers would be achieved through tests or engineering (D. Woolley, Building Research Establishment Borehamwood, UK). The third lecture was devoted to temperature-resolved pyrolysis mass spectrometry of fire retardant polymer blends (R. Luijk, J. J. Boon, University of Amsterdam, Dept. of Environmental and Toxicological Chemistry, Amsterdam, The Netherlands). The last two reports, about PUR-sandwich panels in the development of fire regulations in Europe in building industry (R. Walter, Bayer AG, Leverkusen, Germany) and about laboratory systems to evaluate the toxicity of polymers' combustion products and hazard assessment (J.-M. Jouany, UFR Médecine & Pharmacie de Rouen, St. Etienne du Rouvray, France), prompted extensive discussion.

Finally, Prof. G. Camino gave a review of this conference. He spoke about positive and negative points of this meeting.

The Fifth Meeting on fire retardant polymers will be organized in 1994. On the whole, the international meeting's work has shown the increased level of scientific and practical studies on combustion of polymers and retardation of burning.