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## **f** 1<sup>st</sup> AMI Fire Retardants Conference in USA is big success

On 16 and 17 June 2011, AMI held its first “Fire Retardants in Plastics” conference in the United States. 150 delegates gathered in Denver, Colorado, to discuss recent developments in flame retardants technologies and environmental aspects. Building on the experience of AMI’s Fire Resistance conferences in Europe, this new event for the American market featured leading experts covering the latest legislative issues, additive technologies, flame retardant compound formulations and applications. Dedicated sessions addressed key topics such as electrical and electronic applications, decaBDE replacements, halogen-free options, nano-technology, and minerals for flame retardant formulations. In addition to a general overview presentation on *pinfa* by the vice-chairman, Adrian Beard, several *pinfa* members made presentations on their products. The impressive turnout and lively discussions showed that there is a strong and growing interest in the United States for state-of-the-art, environmentally compatible flame retardants.

More info: <http://www2.amiplastics.com/Events/Event.aspx?code=C400&sec=1617>



## **f** New US school bus fire safety requirements

The US states of Nevada and Maryland are the first to pass new legislation requiring up-to-date fire safety in school buses. The US National Transportation Safety Board (NTSB) reports that there are over 2 200 school bus fires annually in the USA. The Nevada legislation requires that school bus seating must respect heat release and mass loss criteria, and that plastic engine compartment components must be UL 94 V0. The Maryland legislation requires that seat upholstery meet National School Transportation fire block criteria.

Fire Safety for All, 1<sup>st</sup> July 2011: <http://firesafetyforall.com/2011/07/nevada-and-maryland-drive-school-bus-fire-safety-for-our-kids-with-new-law/>

Nevada Senate Bill 318: [http://www.leg.state.nv.us/Session/76th2011/Bills/SB/SB318\\_EN.pdf](http://www.leg.state.nv.us/Session/76th2011/Bills/SB/SB318_EN.pdf)

Maryland Senate Bill SB 369: [http://mlis.state.md.us/2011rs/fnotes/bil\\_0009/sb0369.pdf](http://mlis.state.md.us/2011rs/fnotes/bil_0009/sb0369.pdf)



## **f** European Commission publishes flame retardants study

A study dated April 2011 by Arcadis Belgium has been published by the European Commission, summarising risk assessment data for flame retardants (FRs) used in consumer goods and EU fire fatality statistics. The study concludes that to provide an opinion on the safety of the FRs, further data is required, so that conclusions are reached for only 6 of the 42 FRs considered. This data is now largely available or under development through REACH. The study also attempts to assess whether fire deaths are shown to be reduced in those EU Member States which have certain consumer product fire safety regulations in place stricter than European standards. However, only 7 countries have such legislation, and for only 3 of these are statistical data available and relevant. The study indicates that for these three Member States (the UK and Ireland - furniture, mattresses, and France - bedding), fire safety regulations for consumer products have been accompanied by a significant reduction in fire deaths. In the UK, where detailed analysis has been carried out and published by the Government (see *pinfa* Newsletter n°10), the furniture fire safety regulations are considered to demonstrably result in fewer fire deaths. UK furniture fire safety regulations are estimated to account for 54 fewer deaths per year, 780 fewer injuries and 1065 fewer fires, with an economic saving of UK£ 140 million per year.

*Acradis EBRC Belgium "Study of flame retardant substances in consumer products in domestic environments", April 2011, published by the European Commission (DG Consumer Affairs) at:*

[http://ec.europa.eu/consumers/safety/news/flame\\_retardant\\_substances\\_study\\_en.htm](http://ec.europa.eu/consumers/safety/news/flame_retardant_substances_study_en.htm)

*Statistical report on the effectiveness of the UK Furniture and Furnishings (Fire) (Safety) Regulations, 1988, Greenstreet Berman, December 2009: <http://www.bis.gov.uk/files/file54041.pdf>*

## **f** Halogen-free monitors achieve TCO Certified Edge

To date, three manufacturers have obtained the prestigious and innovative TCO Certified Edge label for their computer monitors: Lenovo, Philips and NEC (see below). The TCO Certified Edge goes beyond the standard TCO Certified label, in particular requiring that the product and its peripherals and cables be completely halogen free (see *pinfa* Newsletter n° 5). TCO's CEO Soren Enholm states "The fact that we are now able to announce a product that has eliminated the halogens chlorine and bromine completely is a huge step in creating greater sustainability in the design of PC products".

*TCO Certified Edge displays to date:*

*Lenovo LT1952pwD, LT2252pwD, L2321xwD, L2021 Wide, L2251xwD, 2578-HB6, Thinkvision L2251x Wide  
Philips 220BL2, 225BL2, 225PL2,  
NEC EA22MWe*

*TCO certification product data base: [http://www.tcodevelopment.com/pls/nvp/tco\\_search](http://www.tcodevelopment.com/pls/nvp/tco_search)*



## **f** PIN resin wins innovation prizes

A new polyester resin for composites, meeting railway fire safety standards (EN 45545 highest fire rating), has been awarded the Total “Ecosolutions” label and the JEC Innovation Award 2011 for Materials. The FireBlock Intumescent UPR Resin offers a lower density than standard products, enabling carbon savings in transport applications, is free of halogens and carcinogenic, mutagenic or reproductive toxic substances, offers flexibility in shape, colour and design, and is compatible with carbon fibre technology. Cost-effectiveness for small-run production makes such composites well adapted for bus and railway interior parts, because of low viscosity compatible with hand lay-up, spray-up, RTM, BMC and pultrusion processes. The potential market is considerable as currently composites represent only a small percentage of bus and rail interior parts, compared to 20 – 50% in aircraft construction. Carlson Engineered Composites are using the resin for several parts on the New Flyer Xcelsior intercity bus, conform to US Federal Docket-90 fire safety standards.

Photo: New Flyer Xcelsior [www.newflyer.com](http://www.newflyer.com)

Nordsodyne FireBlock is developed by Cray Valley [www.crayvalley.com](http://www.crayvalley.com), with partners Mariskone (Spain), Diseñoe innovacion S.L. (Spain) and Crepim (France)



JEC Innovation Awards 2011: <http://www.jecomposites.com/events/innovation-awards-paris-2011>

Total Ecosolutions Label: <http://www.total.com/en/our-challenges/preserving-the-environment/combating-climatechange/improving-energy-efficiency/the-total-ecosolutions-program/total-ecosolutionsproducts-and-services-201012.html>

Carlson Engineered Composites Inc, Winnipeg, Manitoba, Canada: <http://www.carlsongrpco.com/the-carlson-blog/2011/07/tough-resins-for-aggressive-environments>

## **f** Apple innovative fire safety product

Apple has published a patent application for “a new advanced halogen-free material that is likely to be integrated into the manufacturing of Apple products like keyboards, mice, iPods, the iPad, cabling and more”. Apple indicate that 19% of fire related injuries are caused by fires starting with electrical faults in wiring or equipment, and that the increased use of flame retardants can reduce the number of such fires. The Apple patent is for a composite resin, with excellent flame retardancy (self fire extinguishable), and offering physical qualities including electrical insulation and crack resistance. The included flame retardant system includes alkali earth metals, nitrogen, borates and silicon.

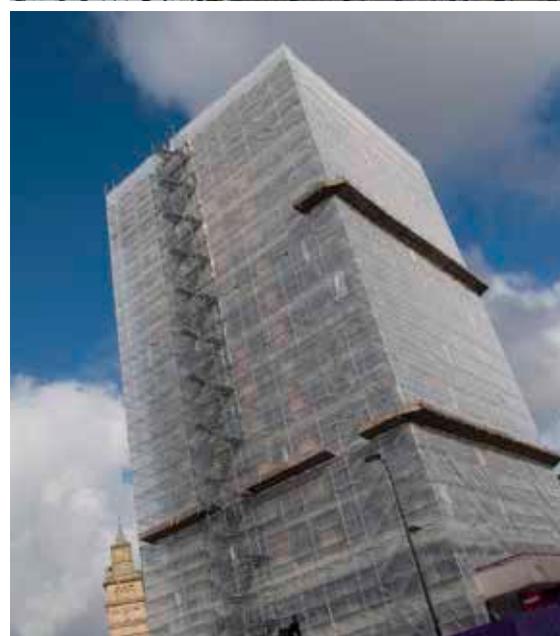
Patently Apple, 16<sup>th</sup> June 2001: <http://www.patentlyapple.com/patently-apple/2011/06/future-apple-products-likely-to-use-halogen-free-flame-retardant-materials.html>



## **f** New performance PIN FRs for films and sheet plastics

The textile fire safety specialist Thor has released two new halogen-free flame retardants for thin films and thin polyolefin articles such as tapes, weaves and non-wovens. The FRs offer high mechanical performance (flexibility, stretching, tensile and tear strength) and excellent transparency, along with good fire resistance, reduced smoke production and carbon monoxide release. Effectiveness is further improved by combination with amino ether HALS synergists. Applications are also being developed in other resins. The organic nitrogen-phosphorus based AFLAMMIT® PCO 700 and 800 have both been successfully registered as new substances under REACH and on the USA TCSA inventory. Fire safety is critical for protective films used in transport and for plastic sheeting used in construction, because the risk of fire starting and propagating is particularly high during transport, manipulation and building works. Other applications include e.g. solar panel backsheets, insulating films and decorations in buildings, personal protective equipment, etc.

Further information [www.thor.com](http://www.thor.com) "Innovative Flame Retardants from Thor" at <http://thor.adept.co.uk/news.asp>  
Contact [linda.green@thor.com](mailto:linda.green@thor.com)



## **f** TEHP under consultation in California

The Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency has included one PIN flame retardant, TEHP Tris (2-ethylhexyl) phosphate, in a list of 39 chemicals for discussion and possible preparation of hazard identification materials for consideration by the Carcinogen Identification Committee. This follows preliminary screening of several hundred chemicals not currently identified as carcinogenic. Public comment on this proposal is requested until deadline 17h00 on 20<sup>th</sup> September 2011 by email to [coshita@oehha.ca.gov](mailto:coshita@oehha.ca.gov).

OEHHA list of 39 chemicals for discussion: [http://www.oehha.ca.gov/prop65/public\\_meetings/prior072211.html](http://www.oehha.ca.gov/prop65/public_meetings/prior072211.html)

Summary of preliminary screening information on TEHP:

[http://www.oehha.ca.gov/prop65/public\\_meetings/CIC101211/101211Tris2ethylhexylphosphate.pdf](http://www.oehha.ca.gov/prop65/public_meetings/CIC101211/101211Tris2ethylhexylphosphate.pdf)



## *f* UK government report on flame retardant technologies

The UK Environment Ministry, DEFRA, has published a strategic report into fire retardant technologies: safe products with optimised environmental performance. The report particularly looks at how Ecolabel criteria and Green Public Purchasing can push towards environmentally preferable chemicals and technologies, without compromising fire safety, concluding “*There is general support from various industry sectors for inclusion of a flammability criterion in the EU Ecolabel*”. It is noted that design-based and inherent FR material approaches can avoid the use of chemical FR technologies, but that these may not in all cases offer the best whole life environmental performance and so chemical FR technologies that are good environmental performers should not be excluded.

*DEFRA Science and Research Projects: Fire Retardant Technologies: safe products with optimised environmental performance - EV0432 (AEA Technology, GnoSys UK, University of Bolton, Oakdene Hollins Ltd.), November 2010:*  
<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=16838>

## *f* Lanxess develop performance PIN elastomers



Lanxess has published studies showing that new compounding of Levapren® (Ethylene Vinyl Acetate - EVM) and Therban® (Hydrogenated Nitrile Butadiene Rubber - HNBR) can produce high performance, media-resistant, halogen-free, low smoke toxicity, elastomer materials (HFFR/FRNC). Applications targeted range from renewable energies and offshore industries to ship building, construction, mass transit and railways. EVM offers excellent ozone and weather resistance. HNBR offers good resistance to oil, heat and abrasion. Both elastomers are halogen-free and, with suitable flame retardants, can achieve high fire resistance as well as mechanical strength. Tests of various PIN flame-retarded formulations based on EVM or EVM/HNBR blends are presented including oil resistance, fire resistance (heat release), and various mechanical properties.

*Source: A. Roos, Lanxess Deutschland GmbH, “Halogen Free Flame Retardant (HFFR) Compounding with EVM and EVM/HNBR”, KGK Magazine (Raw Materials and Applications), March 2011: <http://www.kgk-rubberpoint.de/texte/anzeigen/2437/Halogen-Free-Flame-Retardant-HFFR-Compounding-with-EVM-and-EVM-HNBR>*



## **f** EVCCO HFT conduits protect cables and air systems

Australia's EVVCO HFT (Halogen Free Flame Retardant) polymer electrical and safety conduits offer protection of cable systems or of air conduits (eg. aspiration systems, air sampling systems) against fire and toxic gases, and against day-to-day wear (impacts, dust, water, cleaning agents ...). Because they are flexible and lighter than metal conduits, with glued or rubber-sealed connections, installation is faster and more economic. The conduits are available in 20 – 150 mm diameter, and offer advantages of very low smoke formation and no toxic or corrosive gas release, resistance to fire propagation and to high temperatures. EVCCO was selected as a finalist in the Big 5 Gaia environmental innovation awards, Dubai, 2009. Recent installations of EVCCO conduits include Fonterra dairy cool store (-10°C operation), with Calair Systems in Sydney's Epping-Chatswood rail link tunnel, the ANZ Bank headquarters Melbourne, Masdar EcoCity (Abu Dhabi).



*The EVCCO range is conform to AS/NZS standards 2053:2001, BS/EN 61386-21, IEC 60423, Australasian Green Star, LEED (Leadership in Energy and Environmental Design) Green Building, Estidma (Arabic building sustainability).*

EVCCO (Environmental Conduit Company) [www.evcco.com.au](http://www.evcco.com.au) part of Albatech Pty Ltd

Calair Pipe Systems [www.calair.net.au](http://www.calair.net.au)

## **f** Electrical fire kills in Netherlands

13<sup>th</sup> July 2011: A man was killed in Rijswijk (Southern Netherlands) in a house fire caused by overheating of video/audio electrical equipment. About 19% of fired deaths are caused by fires started in electrical and electronic equipment (source: Apple). One person dies every week in the UK because of electrical fires, and 80 preventable electrical fires occur, according to the UK Electrical Safety Council.

Source: [http://www.rijswijktekijk.nl/rijswijks\\_nieuws\\_bulletin.htm](http://www.rijswijktekijk.nl/rijswijks_nieuws_bulletin.htm)

UK Electrical Safety Council : <http://www.esc.org.uk/public/news-and-campaigns/news/news/article/one-death-and-80-preventable-electrical-fires-every-week-means-lives-at-risk-this-bank-holiday-week/>



## **f** Opportunities for PIN FRs in China

Industry experts foresee a rapid expansion of PIN flame retardant applications in China, through technological innovation and opportunities, and because of supply and cost issues with bromine and antimony. The issues were explained by Ryan Darmawan of A. Schulman, a leading international supplier of specialist plastics (custom compounds, masterbatches) at the 2<sup>nd</sup> International Conference on Flame Retardants China (May 2011). China supplies nearly 20% of world bromine demand, but Chinese sources are depleted and there is a global shortfall estimated at 10%. China supplies around 90% of world antimony demand, and like other rare earth metals, supply is environmentally critical. For both substances, recovery and recycling is important, but seems unable to prevent pressure on supply and resulting price increases in the short-medium term.

A. Schulman: [www.aschulman.com](http://www.aschulman.com)

2nd International Conference on Flame Retardants Requirements, Challenges and Innovations, Guangzhou, China:  
[http://www.skz.de/en/training/conferences/international\\_conference/1499.html](http://www.skz.de/en/training/conferences/international_conference/1499.html)

## **f** KONE elevators choose halogen-free wiring

KONE's new commercial elevators (lifts) use halogen-free, fire-resistant, low smoke cables. KONE has been selected to install the 40 elevators in the 6 stations of Delhi Metro's new Airport Express line in India, which opened in February 2011. The MonoSpace and TransSys models present "halogen-free" as one of the key, special safety features. KONE's ranges of TravelMaster and TransitMaster elevators (escalators, moving walkways) also boast halogen-free wiring as a valuable safety feature.

KONE elevators in Delhi Airport Express line:

[http://www.kone.com/countries/en\\_IN/about\\_us/media/Pages/KONE%E2%80%99s-high-end-elevators-on-the-newly-opened-Delhi-Airport-Express-line.aspx](http://www.kone.com/countries/en_IN/about_us/media/Pages/KONE%E2%80%99s-high-end-elevators-on-the-newly-opened-Delhi-Airport-Express-line.aspx)

KONE TravelMaster: <http://www.infolink.com.au/c/Kone-Elevators-228196/Kone-Releases-New-TravelMaster-110-Commercial-Escalators-n898227>

## **f** Carbon monoxide detectors mandatory in California

From 1<sup>st</sup> July 2011, carbon monoxide (CO) detector alarms will be mandatory in homes in California (all new and existing homes which have fossil-fuel burning appliances, fireplaces or an attached garage). The bill enacted in May 2010 requires installation by 1<sup>st</sup> July 2011 in all single-family homes which have fossil-fuel burning appliances, fireplaces or attached garages. For apartments, hotels and other residential buildings, the installation deadline is 1<sup>st</sup> January 2013. 30 – 40 people are estimated to die each year in California because of carbon monoxide poisoning. Battery-powered detectors, conform to standards, can be purchased for 25 – 30 Euros.

California Senate Bill 183: [http://www.leginfo.ca.gov/pub/09-10/bill/sen/sb\\_0151-0200/sb\\_183\\_bill\\_20100507\\_chaptered.pdf](http://www.leginfo.ca.gov/pub/09-10/bill/sen/sb_0151-0200/sb_183_bill_20100507_chaptered.pdf)



## **f** Innovative, sustainable fire safety of recycled fabrics

A UK project is developing novel, environmentally sustainable fire safety solutions for non-woven fabrics manufactured from post-consumer recycled fibres, for use in furniture, car transport interiors, insulation. The Reduced Emissions by Development of Novel Sustainable Flame Retardant Products (REDFR) Consortium is addressing the fact that the proportion of wool fibres in “waste” fibres is decreasing as consumers are increasingly choosing fleeces and garments made from synthetic fibres. Traditional flame retardant products for recycled synthetic fibres “are available, but many of these have associated health concerns including bioaccumulation and carcinogenicity, and are harmful to the environment. The use of many previously commonplace FRs is now banned”. The Consortium’s alternative flame retardant system is halogen-free, Deflamo Apyrum product, developed for use in polyester, viscose cotton and blended fabrics. The life cycle assessment (by GnoSys UK) shows considerably lower environmental impact than manufacturing fabrics from virgin wool, and a lower impact than traditional FR systems in 7 out of 10 categories considered. Fire safety conform to UK Furniture Fire Safety Regulations is achieved.

REDFR (Reducing Emissions by Development of Novel Sustainable Flame Retardant Products):

<http://www.fira.co.uk/technical-information/article/240/redfr---reducing-emissions-by-dev>

Deflamo Apyrum range: [www.deflamo.se](http://www.deflamo.se)

“Materials World” article: <http://www.iom3.org/news/waste-textiles-work-against-fire>

## **f** 22 die in India bus fire

7<sup>th</sup> June 2011: the 22 passengers of a coach were killed when the vehicle caught fire, after toppling onto its side and leaving the road, near Vallore, Tamil Nadu, India. The KPN Travels coach was going from Tirupur to Chennai. The coach is stated to have burst into fire in seconds after the accident, and was in flames for nearly an hour and bodies were burnt beyond recognition. Only the driver escaped alive. It is suggested that a short circuit in the coach’s air conditioning equipment following the accident caused the fire. International coach and bus fire safety regulations can be considered the opposite of railway standards: little or no fire safety of materials is required in buses and coaches, for example only a simple horizontal flame spread test in Europe, with no requirements for smoke or heat release.

SP Sweden position on bus fire safety: <http://www.sp.se/en/press/news/releases/Sidor/20090306.aspx>

Vellore bus fire: <http://www.ndtv.com/article/india/22-dead-in-vellore-bus-fire-this-man-survived-110836>



## *f* Other news on flame retardants

The Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency has proposed that the chlorinated flame retardant chemical TDCPP be classified as carcinogenic, following results of in vitro and in vivo studies. OEHHA emphasises that TDCPP is structurally similar to the halogenated carcinogens TDBPP and TCEP and is metabolised to other carcinogenic chemicals.

The EU Commission has opened a public consultation (**to 9<sup>th</sup> September 2011**) concerning how to assess the health and environmental impacts of mixtures of chemicals, or combinations of chemicals in the environment. At present, EU legislation (including REACH) only looks at the isolated effect of each chemical, as does all legislation elsewhere in the world.

OEHHA Proposition 65 "Announcement of Carcinogen Identification Committee Meeting Scheduled for October 12 and 13, 2011, and Availability of Hazard Identification Materials for Fluoride and Its Salts, and Tris(1,3-Dichloro-2- Propyl) Phosphate": [http://www.oehha.org/prop65/hazard\\_ident/070811hid.html](http://www.oehha.org/prop65/hazard_ident/070811hid.html)

EU consultation on the "Toxicity and Assessment of Chemical Mixtures" – to 9<sup>th</sup> September 2011:

[http://ec.europa.eu/health/scientific\\_committees/consultations/public\\_consultations/scher\\_consultation\\_06\\_en.htm](http://ec.europa.eu/health/scientific_committees/consultations/public_consultations/scher_consultation_06_en.htm)

## *f* Abbreviations

PBDE:	Poly brominated diphenyl ethers	halogenated flame retardants
POP:	Persistent Organic Pollutant	
SPE:	US Society of Plastic Engineers <a href="http://www.4spe.org">www.4spe.org</a>	
NFPA:	US National Fire Protection Association <a href="http://www.nfpa.org">www.nfpa.org</a>	
TCEP:	tris(2-chloroethyl) phosphate	halogenated flame retardant
TDBPP:	Tris(2,3-dibromopropyl) phosphate	halogenated flame retardant
TDCPP:	Tris(1,3-dichloro-2-propyl) phosphate	halogenated flame retardant
TEHP:	Tris (2-ethylhexyl) phosphate – C <sub>24</sub> H <sub>51</sub> O <sub>4</sub> P	PIN flame retardant



## f Agenda

Events with active pinfa participation are marked: ▶

11-15 Sept. 2011	Cagliari, Sardinia, Italy	7 <sup>th</sup> Mediterranean Combustion Symposium <a href="http://www.ichmt.org/mcs-11/">http://www.ichmt.org/mcs-11/</a>
19-21 Sept. 2011	New Delhi, India	Fire India 2011 <a href="http://www.fire-india.com">www.fire-india.com</a>
20 Sept. 2011	Warrington, Cheshire, UK	Half-day Seminar: Flammability in Furniture and Furnishings <a href="http://www.bureauveritas.co.uk/">http://www.bureauveritas.co.uk/</a> (see "Events" in top "News" menu)
21-23 Sept. 2011	Berlin, Germany	Thermosets 2011, from monomers to components (Fraunhofer PYCO) <a href="http://www.thermosets.de">www.thermosets.de</a>
27 Sept. 2011	Bruay-la-Buissière (near Béthune), France	CREPIM training: rail transport and fire, the new TS45545 specifications: <a href="http://www.up-tex.fr/actualites/article/journee-dinformatons-sur-la-reglementation-ferroviaire-du-crepim-1.html">http://www.up-tex.fr/actualites/article/journee-dinformatons-sur-la-reglementation-ferroviaire-du-crepim-1.html</a>
23-28 Oct. 2011	Portland, Oregon, USA	Society of Fire Protection Engineers annual meeting <a href="http://www.sfpe.org/Education/2011SFPEAnnualMeeting.aspx">http://www.sfpe.org/Education/2011SFPEAnnualMeeting.aspx</a>
26-28 Oct. 2011	Nashville, Tennessee	Polyurethanes Technical Conference <a href="http://www.polyurethane.org/s_api/index.asp">http://www.polyurethane.org/s_api/index.asp</a>
8 Nov. 2011	▶ Taipei, Taiwan	<b>pinfa workshop on sustainable flame retardants in E&amp;E</b> hosted by TCPA; Contact: <a href="mailto:sdl@cefic.be">sdl@cefic.be</a>
9-11 Nov. 2011	Taipei, Taiwan	12 <sup>th</sup> Electronic Circuits World Convention (ECWC12) <a href="http://www.ecwc12.org">www.ecwc12.org</a> in parallel to TPCA (Taiwan Printed Circuit Association) Trade Show <a href="http://www.tpca.org.tw/index.aspx?lc=2">http://www.tpca.org.tw/index.aspx?lc=2</a>
9 Nov. 2011	Edinburgh, UK	Science of Suppression FIRESEAT <a href="http://www.see.ed.ac.uk/FIRESEAT/">www.see.ed.ac.uk/FIRESEAT/</a>
29 Nov. – 1 Dec. 2011	▶ Cologne, Germany	Fire Resistance in Plastics 2011 (AMI conference) <a href="http://www2.amiplastics.com/Events/Event.aspx?code=422&amp;sec=1836">http://www2.amiplastics.com/Events/Event.aspx?code=422&amp;sec=1836</a>
12-14 Dec. 2011	Orlando, Florida	Fire & Life Safety Conference (NFPA) <a href="http://www.nfpa.org/displayContent.asp?categoryID=2088">http://www.nfpa.org/displayContent.asp?categoryID=2088</a>
14-16 March 2012	New York	5 <sup>th</sup> International Symposium on Tunnel Safety & Security <a href="http://www.istss.se/en/Sidor/default.aspx">http://www.istss.se/en/Sidor/default.aspx</a>
25-29 March 2012	San Diego, California	ACS Fire and Polymers VI conference <a href="http://portal.acs.org">http://portal.acs.org</a>
16-17 April 2012	Shanghai, China	3rd International Conference on Flame Retardants <a href="http://www.skz.de/en/training/conferences/international_conference/1499.html">http://www.skz.de/en/training/conferences/international_conference/1499.html</a>
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) <a href="http://www.nfpa.org/displayContent.asp?categoryID=943">http://www.nfpa.org/displayContent.asp?categoryID=943</a>
27-28 Sept. 2012	Chicago	2 <sup>nd</sup> International Conference on Fires in Vehicles (FIVE) <a href="http://www.firesinvehicles.com">www.firesinvehicles.com</a>