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Workshop on design for fire safety in green electronics

San José, California, 30 April – 1 May 2019. Day 1 will provide an overview of flame retardants, fire testing and formulation for electrical and electronic applications, with presentations by Alex Morgan (UDRI), testing and standards organisations and compounders. Day 2 will discuss emerging flame retardant needs for green materials for electronics applications, resulting from developments in performance and fire testing requirements and sustainability specifications, with OEM and component manufacturer perspectives.

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SABIC: new pinfa member

pinfa's new member SABIC (Saudi Basic Industries Corporation) www.sabic.com is a global petrochemical company, and a major producer of polyethylene, polypropylene and other advanced thermoplastics. SABIC operates in more than 40 countries and manufactures in the Americas, Europe, the Middle East and Asia Pacific. SABIC offers a range of innovative PIN flame retardant solutions, as well as flame retardant polymers, for all industry sectors. In particular, SABIC develops performance PIN fire safety solutions for sectors where fire safety requirements are stringent and critical, such as mass transport, consumer electronics and industrial electrical equipment, with an emphasis on material qualities such as mechanical, aesthetic and durability performance. Membership of pinfa will enable SABIC to participate in joint industry work to promote environmental and sustainable solutions to achieve fire safety.

www.sabic.com



EU consultation on circular product policy

The European Commission has opened a public consultation to 24th January 2019 on product policies relevant to the Circular Economy. Questions in the consultation address, amongst others, restrictions of hazardous substances (REACH, RoHS), waste legislation (WEEE, ELV), GPP (Green Public Procurement), the EU EcoLabel, environmental footprints and environmental information. Specific sections address E&E, furniture, textiles and toys. The consultation is intended for response from individuals, rather than organisations.

EU public consultation “Towards an EU Product Policy Framework contributing to the Circular Economy”, open to 28 January 2019 https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-2409307/public-consultation_en



pinfa General Assembly

pinfa's General Assembly took place in Cologne, 10th December, with nearly 50 participants from pinfa member companies and an invited speaker from environmental NGO ChemSec. Initial results of major testing programmes engaged by pinfa were presented: recycling of polymer materials containing PIN FRs (Fraunhofer LBF) and smoke emissions testing comparing neat polymers with polymer - PIN FR compounds (CREPIM). Sonja Haider presented ChemSec's "Marketplace" system, which enables companies to advertise chemicals with positive environment and health profiles which aim to substitute problematic chemicals (in particular those on the SIN and Substitute Now lists). After less than a year, the ChemSec MarketPlace already has over 130 substance proposals, from some 70 companies, including several pinfa members. The demand from electronics manufacturers for recognised third-party assessments (e.g. GreenScreen) of substitute FRs for the US EPEAT label was discussed, deciding that pinfa will link such reports in the pinfa website Product Selector, where companies make these public. The meeting enabled members present to suggest priority actions for pinfa in 2019, which will now be discussed by the Board, along with projects already decided: further electromobility workshops following the successful meeting in China reported in pinfa Newsletter n°96, promotion of fire safety in EU policies, European workshop 2019 with R&D projects into polymer recycling, publication of results of pinfa PIN FR material recycling project and of pinfa smoke emissions testing.



Information on pinfa membership and participation in future pinfa General Assemblies jcr@cefic.be



pinfa Annual Report brochure

For the first time, pinfa has published an Annual Report, summarising key actions in 2018 and perspectives for 2019. This was released at the AMI FRiP ([Flame Resistance in Plastics](#)) 2018 conference. The report notes that 2018 saw pinfa continue to expand its membership (now 32 companies) and its geographical coverage (pinfa North America 2012, pinfa China launched 2018). Spotlights cover the new needs for fire safe materials in electric vehicles (electromobility), the pinfa smoke emissions toxicity testing campaign with CREPIM (comparing neat polymers to PIN FR treated polymers), concerted action for a revision of the Sweden ecotax on flame retardant materials in electrical goods, action with scientists and stakeholders to promote the inclusion of fire safety in Europe's next R&D funding programme (Horizon Europe, see below). pinfa communications and advocacy actions in 2018 are summarised (outreach Advisory Board dialogue with stakeholders, pinfa Newsletter and website, participation in conferences and external events, pinfa-na North America workshops and conferences), input to European policy (REACH and ECHA, Construction Products Regulation, EcoDesign, Green Public Purchasing, RoHS Directive, ...). An interview with new pinfa member, Schneider Electric, summarises why this leading E&E company considers moves towards non-halogenated flame retardant solutions, what obstacles are identified, the importance of standards and possible future trends.

pinfa 2018 Annual Report brochure, available on the pinfa website at: <https://www.pinfa.eu/mediaroom/pinfa-activity-report-2018-is-now-available/>



Safe Chemicals Innovation Agenda

pinfa participated at a workshop on 29th October 2018, Vienna, with representatives from the European Commission as well as Netherlands and Austria national authorities in order to discuss a research programme on safe chemicals, which will be proposed for inclusion into the EU's next R&D funding programme 'Horizon Europe'. The workshop discussed ensuring that chemicals developed in the future are safe for use, possible trade-offs with performance, substitution both of chemicals and of design/function. This follows the publication by the Netherlands Government of a report by Wood and CSES consultants, developed after wide consultation of stakeholders and scientists. This report proposes to centre action on seven chemical functions, including fire safety. It also underlines the importance of safe chemical design for the Circular Economy (legacy contamination as an important theme for all seven chemical functions proposed).

"Safe Chemicals Innovation Agenda. Towards a research agenda for safe chemicals, materials and products", Netherlands Government, CSES (Centre for Strategy and Evaluation Services) and Wood, K. Bougas et al., June 2018 (71 pages) <https://vereniging-ion.nl/rapport-innovatie-agenda-safe-chemicals-naar-aanleiding-van-eu-workshop-uit>



Stakeholder workshop on fire safety research

Around 100 fire safety stakeholders met at the meeting organised by [IAFSS](#) (International Association for Fire Safety Research) in Brussels 3rd December 2018. The meeting was sponsored by pinfa and others. Speakers included the European Commission (DG R&D strategy, DG R&D wildfires, DG GROW and JRC Joint Research Centre), the Modern Buildings Alliance, Brussels Fire Department, Swedish fire safety research funding organisation Brandforsk, fire safety engineers (SFPE) and leading fire safety R&D institutes. Group discussion developed messages to input to the development of the EU Horizon Europe programme (2021-2028, c. 100 billion € funding) currently under development in the Commission, Council and European Parliament. This is important because Horizon Europe project outcomes are likely to influence future EU regulations and standards on fire safety. The workshop messages include that **fire safety is essential for a desired future**: to enable sustainability (energy-efficient buildings, bio-materials, new energy systems), for smart and compact cities (e.g. high-rise buildings), for new materials and innovation and for an inclusive society (e.g. safety of an ageing population living at home), as well as being vital for society's resilience in contexts of technological developments and climate change. Fire research needs identified include better and more consistent fire data, large-scale testing of new materials, products and construction methods, holistic approach integrating complex systems such as sensors and communications, electronic control of building ventilation and other functions. A meeting summary and a short "fire safety mission statement" for the European Commission, based on the outcomes, are now being developed by IAFSS. Further actions will be defined, possibly including a call to IAFSS members to support this mission proposal for Horizon Europe and support also by industry and stakeholder organisations.

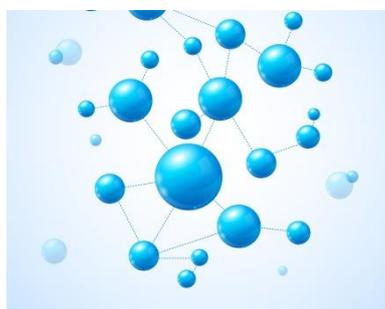
IAFSS workshop on a fire safety agenda for 2030, Brussels, 3rd December 2018, with support of ISO TC92, CEN/CENELEC, pinfa, Brandforsk, Kingspan, Modern Building Alliance, NFPA and Rockwool <https://iafss.org/>



Bio-sourced FR project gets R&D grant

Iowa State University has obtained 2.5 million US\$ funding from the US Department of Energy to develop a process to identify biologically-derived molecules which can lead to new flame retardant or anti-corrosion chemicals. The objective is establish a several stage process: assess scientific literature to identify which chemical structures bring flame retardant properties, model these structures, develop a library of relevant chemicals/structures, identify similar biological molecules, synthesise and test candidate chemicals. The scientists believe that this will open new possibilities, through biobased chemical structures which are not accessible via petro-chemistry.

“Researchers to Develop Renewable Flame-retardant Chemicals with Million Dollar Grant”, SpecialChem, 24 October 2018 <https://polymer-additives.specialchem.com/news/industry-news/researchers-flame-retardant-chemicals-grant-000216245>



Phosphorus and lignin PIN FR for ABS

Lignin is an abundant bio-sourced material which as PIN flame retardant properties by contributing to char formation. In this study, kraft lignin was supplied by the paper industry (UPM Finland). This lignin contained around 6.5 mmol/g of OH content (reactive groups). The lignin reacted with phosphorus pentoxide after solvent dissolution, resulting in phosphorylated lignin with just over 4% P (P-LIG). Pure lignin and P-LIG were tested at 30% loading in ABS polymer (acrylonitrile butadiene styrene). P-LIG showed better thermal stability than pure lignin, and good dispersion in the ABS. At 30% loading, P-LIG reduced peak heat release rate by 1/3 – 2/3*. P-LIG reduced by 25 – 50% peak emissions of carbon monoxide (CO), nitric oxide (NO) and hydrogen cyanide (HCN), however total emissions of these gases were unchanged for CO, decreased by 30% for NO but increased by nearly 20% for HCN. Analysis suggested that the P-LIG was mainly acting in the condensed phase, generating a protective char layer on the polymer, but also to a small extent in the gas phase.

* 1/3 reduction in PCFC = Pyrolysis Combustion Flow Calorimeter, 2/3 reduction in MLC = Mass Loss Calorimeter.

“Phosphorylation of lignin to flame retard acrylonitrile butadiene styrene (ABS)”, B. Prieur et al., Polymer Degradation and Stability 127 (2016) 32e43 <http://dx.doi.org/10.1016/j.polymdegradstab.2016.01.015>



New Epoxy resins for FST applications

Hexion, a global leader in thermoset polymers, in particular epoxy and phenolic resins, has launched a new PIN flame retardant resin system, particularly adapted to infused glass laminate composites, offering fire safety with low smoke density and low smoke toxicity. The new EPON™ FlameX™ Epoxy Resin systems provide parts manufacturers with an innovative, homogenous material, adapted to infusion/resin transfer moulding (RTM) and closed moulding (VARTM), and which achieves fire performance standards for various aviation, marine and railway applications, as well as in construction. The resin system offers mechanical performance and can be used in parts such as aircraft cargo areas, seats, lavatories or galleys.

“Hexion Introduces Novel Epoxy Resin System with Low Fire, Smoke and Toxicity Properties”, 12 September 2017 <http://www.hexion.com/Workarea/DownloadAsset.aspx?id=32167>



Standards for chemicals for the Circular Economy

The European Standards Organisation (CEN/CENELEC) has circulated the final report of the NEN/BTWG11 working group into standards needs for sustainable chemicals for the Circular Economy. Challenges posed to recycling by additives in plastics (stabilisers, flame retardants, colourants) are underlined. Standards development recommendations include minimum quality (characteristics, contaminants ...) for plastics and plastic granulates for recycling, thresholds of contaminants for End-of-Waste and methodology for calculating product recycled content. Research needs identified include: extraction approaches to remove unwanted substances from recycled plastics, sorting and detection systems for plastics, mechanical and chemical recycling of plastics, recovery of chemicals from plastics, research into how additives hamper plastics recycling and establishment at CEN/CENELEC of a mechanism to identify standards that exclude recycled materials.

CEN prEN 45557 proposal of 2017 submitted to final vote 28/12/2018

<https://www.iec.ch/dyn/www/f?p=103:182:11962059414905> – draft texts available here

<https://www.eera-recyclers.com/files/cen-clc-tc10sec132dc-secr-enquiry-pren45557-recycled-material-content.pdf>

CEN-CLC/BTWG 11 'Sustainable Chemicals'

https://www.cencenelec.eu/news/brief_news/Pages/TN-2018-023.aspx



FR 3D-printing nylon for aerospace

3D Systems, specialist in on-demand manufacturing for a wide range of sectors and applications, has launched DuraForm ProX FR1200(SLS) a flame retardant nylon-12 for direct 3D production of parts for aerospace, transport and consumer applications. The material is compatible with ProX SLS 6100 3D-printer. It is non-halogenated and compliant with U.S. Federal Aviation Regulation 25.853 and within Airbus Industries Test Method (AITM) guidelines for smoke density and toxicity, and offers high quality surface finish for aesthetics and part performance.

<https://www.3dsystems.com/materials/duraform-prox-fr1200>



Thermahood chooses PIN FR polymer for light safety

The Northern Ireland attic light specialist, [Thermahood](#), has selected PIN flame retardant polypropylene for the upside sealing covers of its Down Light Attic Seals ceiling lights. These must ensure an airtight seal, to avoid water vapour and thermal loss into lofts which could lead to condensation, whilst ensuring fire safety when heated by light bulbs and covered by loft insulation. The PIN FR polypropylene from LATI Industrial Termoplastici, Italy, achieves UL 94-V0 (0.75 mm) and you L Relative Thermal Index (see physical properties at hundred and 15° C).

"Thermahood chooses Lati flame retardant for downlight covers", 29/11/2016

<http://www.britishplastics.co.uk/materials/thermahood-chooses-lati-flame-retardant-for-downlight-covers/>



Nexans PIN FR cables are LPCB Certified

Nexans' fire resistant, PIN flame retardant, low smoke Alsecure NX600 armoured power cables have obtained LPCB certification and is BS7846-F120 compliant. The Loss Prevention Certification Board (LPCB) has been active for over 100 years with the UK government and industry setting standards to ensure performance of fire and security products and services. Nexans notes that building fires are increasingly dangerous, reach higher temperatures and behave unpredictably. The Alsecure NX600 cables are insulated using mica and cross-linked polyethylene with PIN flame retardants. They are LSF (Low Smoke and Fume) and offer 120 minute fire resistance (to BS 8519) in order to ensure that power continues to be transmitted in case of fire, enabling operation of communication, alarm, sprinkler and exit systems.

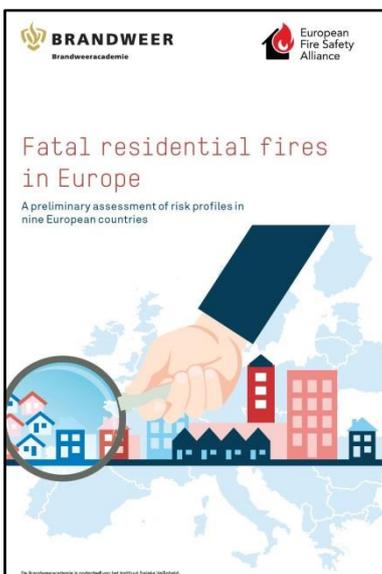
"NX600 maintains circuit integrity for fire safety engineering systems"
http://www.nexans.co.uk/eservice/UK-en_GB/navigate_315906/Alsecure_NX600.html# and
"Nexans NX600 Is Now LPCB Certified" https://www.nexans.co.uk/eservice/UK-en_GB/navigatepub_149242_-36192/Nexans_NX600_is_now_LPCB_Certified.html#



First clear UL94 V-0 LED resin is PIN flame retardant

Electrolube, a global manufacturer of chemicals for electronics, has launched the first UL94 V-0 rated, transparent encapsulation resin for LED applications. The new UR5641 resin is halogen-free and based on aliphatic polyurethane chemistry, without solid fillers and using a specific combination of PIN flame retardants. It is resistant to yellowing by UV light and so useable in both interior and exterior applications. It is flexible and resistant to weathering, acids and alkalis, water and mould growth, at operating temperatures -40 to +120°C. It can be used in hazardous atmospheres, ATEX zones and emergency lighting.

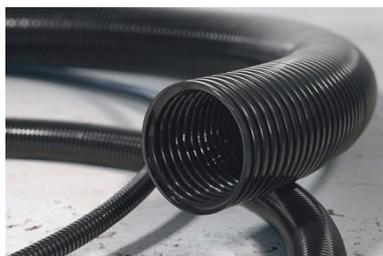
"Electrolube Launches First Clear UL94 V-0 Flame Retardant PU Resin for the LED Market",
 28th March 2018 <https://www.electrolube.com/news/2018/03/28/electrolube-launches-first-clear-ul94-v>



Fatal residential fires in Europe

The European Fire Safety Alliance and Brandweer (Fire Service Academy) have published a 6-page information document communicating key statistics on residential fires. It is noted that the elderly (65+) are particularly at risk of dying in home fires. Most fatal residential fires start in upholstered furniture, beds and mattresses and textiles including clothing. Most fatal residential fires start in the living room. The link between fire deaths and alcohol consumption is highly variable, from 9% in the Netherlands to 70% in Poland.

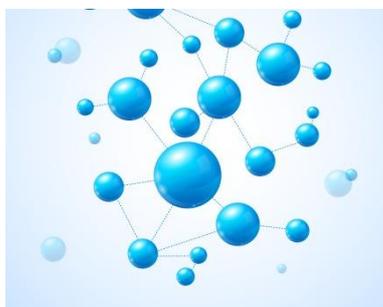
"Fatal residential fires in Europe" <https://www.ifv.nl/kennisplein/Documents/20181120-BA-EFA-Fatal-residential-fires-in-Europe.pdf>



PIN FR polyamide for high resistance cable conduits

HellermannTyton, a global leader in cable installation systems, offers a high mechanical performance PIN flame retardant corrugated polyamide (PA6) conduit HG-FR13. The conduit achieves UL94-V0 and railway fire safety standards, low smoke and low toxicity. Mechanical performance characteristics include flexibility (bend radius 25mm), high impact strength (recovers if crushed) and resistance to fatigue, abrasion, solvents and oils and UV. HellermannTyton both manufacture and install cable fittings, electrical and for data network infrastructure, with a portfolio of 75 000 items as well as developing parts for customer-specific industrial requirements.

“Non-Metallic Conduits HG-FR13” <https://www.hellermanntyton.com/products/non-metallic-conduit-systems/hg-fr13/166-11401>



Biosourced PIN FR organic – mineral aerogels

Aerogels are very low density, porous materials, which offer high potential for innovative applications in packaging and insulation applications. First generation aerogels based on mineral matrices are brittle, with poor mechanical performance. This is improved by integrating organic polymers. This study assessed the use of biosourced porcine gelatin (a by-product of slaughter houses) as a PIN flame retardant in a 50%/50% PVA/clay aerogel: poly(vinyl alcohol) and montmorillonite. At c. 20% gelatin incorporation, mechanical performance was improved (compressive modulus multiplied by three) as was fire performance (LOI – limiting oxygen index – increased from 24 to 28, vertical burn test extinguishing time approximately halved and peak heat release rate reduced by around 15%). The authors conclude that the porcine gelatin is a potentially effective green PIN flame retardant for these mineral-organic aerogels, improving both fire resistance and mechanical performance.

“Green Approach to Improving the Strength and Flame Retardancy of Poly(vinyl alcohol)/Clay Aerogels: Incorporating Biobased Gelatin”, Y-T. Wang et al., *ACS Appl. Mater. Interfaces* 2017, 9 (48), pp 42258–42265 <http://dx.doi.org/10.1021/acsami.7b14958>

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For abbreviations see: www.pinfa.org