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The Circular Economy is a priority for Europe's future environment, economy and jobs (see e.g. Ellen MacArthur Foundation in pinfa Newsletter n°79). PIN flame retardants are recognised as playing a key role in bringing together sustainable fire safety and circularity. PIN FRs are compatible with materials recycling. PIN FRs enable fire-safe performance materials to be produced from secondary or bio-sourced materials. Two EU-funded R&D projects developing innovative circular economy materials using PIN FRs are presented in this Newsletter: BRIGIT (panels for vehicles from paper industry by-products) and FARBioTY (composites based on flax fibres). Another article in this Newsletter presents research development of a phosphorus polymer PIN FR based on recycled para-aramid fibres. A third EU project, Phoenix, is developing phosphorus-based FRs based on lignin, which can be extracted from forestry by-products (see pinfa Newsletter n°65). pinfa members Adeka, BASF, Budenheim, Clariant and Nabaltec have launched a testing project with Fraunhofer LBF to test the recyclability of several thermoplastics formulations using their PIN flame retardants: polypropylene, PC/ABS, polyamides and polyethylenes (see pinfa Newsletter n°60).



AIMPLAS
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Phosphorus, Inorganic & Nitrogen Flame Retardants Ass.

14-15 November 2017, Valencia, Spain

TECHNICAL WORKSHOP

PLASTICS AND FIRE

Flame retardants for thermoplastics and thermosets

ORGANIZED BY PINFA AND AIMPLAS



This AIMPLAS-pinfa conference will cover flame retardant use in plastics in the electrical-electronic, construction and transport sectors. It will offer user industries and stakeholders an overview of the most used non-halogenated flame retardants and of the requirements that must be fulfilled in the different sectors mentioned and their interrelation. Topics will include:

- The most used non-halogenated flame retardants
- Synergies with other additives
- Standards in different sectors
- Flame retardants and Circular Economy
- Environmental impact of flame retardants

COMPLETE PROGRAMME: <http://difusiones.aimplas.es/newslink/13864377/5161.html>

Online registration: <http://difusiones.aimplas.es/newslink/13864377/5158.html>

Email registration: bsancho@aimplas.es



pinfa new member: Greenchemicals

The Greenchemicals company was established in 2010 and is dedicated to innovative and low environmental impact flame retardant solutions, developing new PIN FR formulations with low or no halogens, with low or no antimony, and which are dust free. These solutions are mainly phosphorus based, with nitrogen and inorganic chemistries as synergists or to combine FR properties. Design based on FR mechanisms forecasts the optimal formulation, limiting trial tests and saving development time. Achievements to date include: two PIN HBCD replacement solutions; innovative liquefying system for solid PIN FRs enabling optimisation of loading levels by better dispersion (saving costs), avoiding pre-mixing and use of new PIN FR molecules otherwise difficult to handle; P1-P3 systems where phosphorus acts in the gas phase, with efficient synergists; reactive PIN FR masterbatch for PET, PET/PA fibres, PBT, polyurethane, with copolymerisation to prevent FR migration.

Greenchemicals flame retardants and antioxidant formulations <https://greenchemicals.eu/>

FIRE RESISTANCE IN PLASTICS 2017

pinfa projects at Fire Resistance in Plastics 2017

The full programme of the AMI FRs conference, Köln, 5-7 December 2017, is now published. This year, nearly every presentation on flame retardants addresses PIN FRs, covering phosphorus, nitrogen, metal hydrate, silicone, siloxane, graphite and other novel PIN FR chemistries. Two projects supported by pinfa are presented: pilot recycling of PIN FR plastics, by Fraunhofer LBF, Germany, and the impact of PIN FRs on smoke toxicity, by CREPIM, France.

AMI conference “Fire Resistance in Plastics 2017”, Trends and technical developments in the international flame retardant industry, 5-7 December 2017, Köln <http://www.amiplastics-na.com/events/Event.aspx?code=C847&sec=8402>

99% Less Smoke
Density and
89% Less CO
Emissions Under
Flaming Conditions
as compared to
Br Treated PP



ADEKA obtains first ‘UL Verified’ less smoke, less CO

UL (Underwriters Laboratories), a global safety science organisation, has issued the first ever UL Verified Claim for performance materials to a series of three phosphorus-based PIN FR range produced by pinfa member company ADEKA. UL verified the claim that, used for fire safety treatment of polypropylene (V0 at 1.6 mm), in fire tests, the PIN FRs produced 99% less smoke density and 89% less carbon monoxide compared to brominated FR treatment of the polymer. UL indicates that the use of low smoke performance, based on non-halogenated FRs, is expected to grow in industries such as E&E, electrical building wiring, railways and aerospace. The phosphorus PIN FRs are indicated by UL to “produce less dark smoke and acidic gases, so contributing to fire safety” and can be used in polypropylene PP and polyethylene PE. ADEKA, which marked its 100th anniversary in 2017, offers non-halogenated and low smoke and CO emission-producing flame retardants to the industries including appliance wiring, indoor wiring, automotive, railways and aerospace.

“UL Issues the first UL Verified Mark to demonstrate the performance of functional material to ADEKA’s flame retardants”, Underwriters Laboratories 27th June 2017 and ADEKA 25th June 2017 See also ADEKA phosphorus PIN FRs in pinfa Newsletter n° 52 and Pinfa product selector: <http://www.pinfa.org/index.php/en/product-selector>



pinfa video on FRs and fire safety

pinfa has produced and published a 3-minute video explaining why flame retardants are important, how they are effective, and how they act. Flame retardants are presented as sophisticated, adapted to specific materials, and effective in preventing a fire from starting, slowing the spread of fire, delaying full fire (flashover), reducing fire intensity and reducing smoke generation. By providing a longer escape time flame retardants can help save lives and give more time for fire fighters to act. PIN FRs are presented as responding to fire safety demands in sectors where standards are the most stringent.

“The effectiveness of flame retardants”, pinfa video, 3 minutes, watch or download at http://www.pinfa.org/images/video/PINFA_FR_efficacy_1080p_170708.mp4



All passengers escape with no injuries in plane fire

A SkyWest operated Bombardier CL600 passenger jet, flying for United Express, caught fire after landing at Denver International Airport (DIA), Colorado, 2nd July. More than 63 people on board, passengers and crew, escaped without injury. The fire in one of the two engines mounted on the rear of the aircraft body was successfully extinguished by the airport fire services. The plane had just completed a one hour flight from Aspen. A preliminary report to the Federal Aviation Authority suggests that a tire fire on landing spread to the engine. Aviation applies extremely tight fire safety requirements to all materials, despite widespread use of polymers to achieve lower weight.

Information from FSTB (Fire and Safety Technical Bulletin) <http://www.gbhint.com/fire-safety-and-technology-bulletin/> and <http://www.foxnews.com/travel/2017/07/05/united-express-engine-fire-in-denver-caused-by-tire-fire-says-faa-report.html>



18 people die in German coach fire, 11 in China

A tourist coach taking pensioners to Italy burst into flames and burnt out after hitting a lorry in a slow moving traffic near Stambach, Bavaria, Germany, 3rd July. 18 people were killed and a further 30 injured. The cause of the fire is not yet identified. The lorry trailer is said to have been carrying mattresses and pillows. Fire fighters arrived on the scene within ten minutes but the fire was by then already too intense to approach. The lorry driver, who survived, is reported as indicating that no one was injured in the crash but that the vehicles caught fire almost immediately. In another recent incident, 9th May, 11 children aged 3-7 died in a bus fire in the Taojiakuang Tunnel, Weihai, Shandong, Eastern China. The children, mostly South Koreans, were pupils at the Zhongshi International School. Authorities say the driver set the bus on fire after hitting another vehicle. In another incident in South Carolina, more than 50 students escaped without injury when their school bus caught fire whilst driving. Coach fire safety standards worldwide are very lax compared to railways or aviation (see pinfa Newsletter n°67) so that fire can spread rapidly through flammable materials inside the bus, an exception being US school buses where standards are somewhat higher (pinfa Newsletter n°13).

Media coverage: Germany <http://www.telegraph.co.uk/news/2017/07/03/germany-coach-crash-17-peopleunaccounted-bavariatour-bus-crash/> China <http://english.yonhapnews.co.kr/news/2017/06/02/0200000000AEN20170602010300315.html> South Carolina <https://www.usnews.com/news/best-states/south-carolina/articles/2017-05-09/nearly-60-students-escape-fire-on-south-carolina-school-bus>



CalSAFER guide on alternatives analysis

California's State Safer Consumer Products Information Management System (CalSAFER) has [published](#) an "Alternatives Analysis Guide" which aims to help organisations identify alternative approaches to fulfil the State's regulatory safety requirements for consumer products. Pinfa submitted comments underlining the importance of fire safety and specifying that not all FRs are "hazardous". The final CalSAFER wording has been modified in places to mention "brominated" and not all FRs. Publication of the Guide coincides with entering into effect of a California regulation to include "Children's foam padding systems containing TDCPP or TCEP" (chlorinated FRs) as Priority Products, meaning that manufacturers or importers must assess safer alternatives and declare to authorities.

CalSAFER "Alternatives Analysis Guide" 14th June 2017

<http://www.dtsc.ca.gov/SCP/AlternativesAnalysisGuidance.cfm>

California DTSC (Department of Toxic Substances Control) regulation on "Children's foam padding systems containing TDCPP or TCEP" (tris(1,3-dichloro-2-propyl) phosphate or tris(2-chloroethyl) phosphate), effective from 1 July 2017

http://www.dtsc.ca.gov/SCP/Foam_Padded_Sleeping.cfm



Environmentally preferable roof insulation

With its new PIN flame retardant polyisocyanurate roof insulation, the company GAF is the first to offer a full line of roofing assemblies which do not contain Red List Materials (Red List Declare label, USA). The Red List is [specified](#) by the Green Building Alliance and the International Living Future Institute (ILFI), as part of the Living Building Challenge, and excludes halogenated flame retardants. The GAF EnergyGuard™ NH Polyiso Insulation Board offers high insulation values and FM 4450/4470 Class 1 and UL 1256/790 Class A roofing fire rating. It is compatible Green Building Council [LEED4](#), is GreenCircle recycled content [certified](#) and holds a Health Product Declaration ([HPD Collaborative](#)). It is available in ASTM C1289 (Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board) Class 1, Grade 2 or 3 and is PIMA LTTR Quality Mark [certified](#) (Polyisocyanurate Manufacturers Association – Long Term Thermal Insulation). GAF, North America's largest roofing manufacturer, shows that North America's largest roofing manufacturer (Standard Industries group), can achieve top of class quality, insulation and fire performance.

"GAF Introduces Non-Halogen Polyiso Insulation. Key component of industry's only completely sustainable roofing system" 21 Feb. 2017

https://www.gaf.com/About_GAF/Press_Room/Press_Releases/901906434 and

EnergyGuard™ NH Polyiso Insulation "A Non-Halogenated Polyiso Insulation Board That Is Better For The Environment"

https://www.gaf.com/Roofing/Commercial/Products/Roof_Insulation_And_Fastening_Systems/EnergyGuard_NH/EnergyGuard_NH_Polyiso



Flamar-Flex PIN flame retardant cable for robotics

Molex has extended its range of Flamar cables with Flamar-Flex, offering up to 5x outside diameter bending enabling tight radius applications where reliable, safe, repeated flexibility is required, such as automatic machinery, drag chains and robotics. The cable offers easy strip-back to required lengths, excellent insulation, low cable capacitance, wide operating temperature ranges (-50°C to +90°C depending on applications), abrasion – tear – oil and UV resistance. The cable complies to IEC 60332-1, UL VW1, CSA FT1 and UL Vertical Flame Test and is “halogen-free” (in accordance with IEC 60754-1, EN 50267-2-1 and VDE 0472-815) so ensuring low smoke and low acid gas emissions in case of fire.

www.molex.com and

http://www.molex.com/molex/products/family?key=flamar_standard_industrial_cables



Tesco commits to textiles Detox

Tesco has announced, for its clothing brand F&F, its commitment to the Greenpeace [Detox](#) action, avoiding potentially hazardous chemicals and releasing a complete list of garment suppliers. Tesco joins other major retailers including Aldi, C&A, Lidl and M&S as well as clothing companies including Inditex, Benetton, Burberry, H&M, Levis, Mango, Nike, Primark and Puma. Excluded chemicals are those considered to be potentially bio-accumulative and toxic, carcinogenic, mutagenic or toxic for reproduction (CMR), endocrine disruptive or as having “properties of equivalent concern.” The commitment specifies 11 families of chemicals considered as “priority hazardous” including halogenated flame retardants (not PIN FRs).

Detox campaign <http://www.greenpeace.org/international/en/campaigns/detox/fashion/detox-catwalk/> and criteria https://secured-static.greenpeace.org/international/Global/international/code/2016/Catwalk2016/pdf/Detox_Catwalk_Explained_2016.pdf See also pinfa Newsletter n°63 “Milan Prato chemicals safety commitment” and pinfa Newsletter n°68.



Explanation of high-rise building cladding fire risks

A 3 page article in Asia-Pacific Fire Magazine, published before the tragic Grenfell Tower London fire (see pinfa Newsletter n°81), explains the different types of cladding used on buildings (moisture protection, thermal insulation, decorative covering), building design and realisation issues and materials use. The importance of fire stops in construction is underlined, to stop interior fires reaching cladding (e.g. where floors meet walls). The article explains that not only polymer foams can be involved in the fire, but also moisture barriers which are often bitumen based, mineral wool insulation which contain resin binders, and even aluminium sheets and structures which will melt and drip as small fire balls at 660°C. The article notes that in real fire conditions, the resin binders in mineral insulation can melt and fibres disintegrate then fly as small embers contributing to fire spread, polymer foams can burn and release flaming droplets, and even aluminium can melt. The cladding can thus spread the fire, which can then find its way back into the building in other places if fire stops are inadequate. Falling debris from burning cladding can endanger fire fighters and prevent intervention.

“A Perspective On High Rise Building Fires Involving The Façade”, P. Petrus, MDM Asia-Pacific Fire Magazine, 10th April 2017 <http://apfmag.mdmpublishing.com/a-perspective-on-high-rise-building-fires-involving-the-facade/>



Non halogenated FR market to grow faster

A market report by Technavio (2017-2021) predicts an 8.25% annual growth for non halogenated flame retardant use worldwide (CAGR), to reach over 2.2 million tonnes by 2021. This is significantly higher than the growth predicted by Technavio for total world FR use (2016-2020), see pinfa Newsletter n° 79. Major sectors for non halogenated FRs identified by the latest report include construction, E&E, textile, transport and wires & cables, with a key driver as increasing demand for phosphorus based PIN flame retardants, considered to be “non-toxic and eco-friendly”, with aluminium, magnesium, melamine and boron also cited and regulations such as REACH, the Restriction of Hazardous Substances (RoHS), WEEE, and NAFRA.

Technavio “Global halogen-free flame retardant chemicals market 2017-2021” <https://www.technavio.com/report/global-specialty-chemicals-global-halogen-free-flame-retardant-chemicals-market-2017-2021> and Technavio “Global flame retardants chemicals market 2016-2020” <http://www.technavio.com/report/global-specialty-chemicals-global-flame-retardants-chemicals-market-2016-2020> See also Global Non-Halogenated Flame Retardant Chemicals Sales Market Report 2017 <https://www.marketresearchnest.com/global-non-halogenated-flame-retardant-chemicals-sales-market-report-2017.html>



PIN FR performance servo cables

Igus specialises since 1964 in high-technicity polymer components and assemblies for industry. The company has now extended its CHAINFLEX SERVO range with specialist cables for machine tools, offering specific profiles to ensure reliability according to machine tool needs: bend radius, travel distance, speed. The CF27.D series is protected by an abrasion-resistant external PUR (polyurethane) jacket, using PIN flame retardants. The cables offer a bend radius of just 7.5x the cable diameter. These servo cables respond to demanding requirements such as tight installation spaces and dynamic applications, including gantries. The CH98 uses PIN flame retardant TPE (thermo plastic elastomer) external jacket, resistant to oil and ultraviolet radiation. This cable has been selected by Novel, Shanghai, for its automated screen production site, where it has successfully resolved problems posed by control cable failures in units where space is very limited, reliable tight bending is required and reliability must be delivered at 300 000 double strokes per month. Igus also offers PIN FR cables for railway applications, conform to fire performance IEC 60332-1-2, CEI 20-35, FT1, VW-1 and halogen-free to EN 50267-2-1.

“Igus augments chainflex servo cable offering for machine tool applications”, 10 February 2017 <https://roboticsandautomationnews.com/2017/02/10/igus-augments-chainflex-servo-cable-offering-for-machine-tool-applications/11343/> “chainflex® CFSPECIAL.414 for rail vehicles” http://www.igus.com/wpck/18095/N12_2_9_CFSPECIAL_Schienenfahrzeuge “Used in Shanghai” http://www.igus.com/wpck/18228/app_CFShanghai_BS_EN_50267-2-1:1999 Common test methods for cables under fire conditions. Tests on gases evolved during combustion of materials from cables. Procedures. Determination of the amount of halogen acid gas. Determination of the amount of halogen acid gas <http://shop.bsigroup.com/ProductDetail/?pid=00000000019987486>



PIN FR speciality thermoplastics for LEDs

Lanxess has developed performance PIN FR materials for LEDs (light emitting diodes). A new PIN FR PCT polyester (polycyclohexylene dimethylene terephthalate) provides light-weight and flexible application with optimised light reflection, temperature and light resistance, flowability for processing, thermal conductivity to avoid overheating in use and PIN flame retardance to ensure fire safety. This will be used for LED chips, housings, connectors and components. PIN flame retardant PBT (polybutylene terephthalate) reflective grades, with high ageing resistance, are adapted for housings of LED downlights and spotlights. A high performance polyamide 6 combining light reflection and high thermal conductivity, with PIN FR fire safety, is adapted to components subject to concentrated heat due to LED miniaturisation. pinfa member, Lanxess is a leading global speciality chemicals company, employing over 16 000 people in 29 countries.

“Thermoplastics tailored to LEDs. Team of light industry specialists set up. Range now includes PCT compounds for LED chips. New polyamide combines thermal conductivity with efficient flame retardance” [Lanxess press release](#)



pinfa is now cefic's only fire safety group

EFRA (European Flame Retardants Association) officially ceased to be a cefic Sector Group at the end of June 2017. This means that pinfa is now the only European industry group representing flame retardant manufacturers and users within Cefic (the European Chemical Industry Council) and the only. Pinfa is continuing to grow, reflecting the increasing recognition of the sustainability advantages and technical performance of PIN fire safety solutions. pinfa and pinfa-na (pinfa North America) now have a total of 30 members.



PIN flame retardant performance propylene compounds

Polyrocks, China, with nearly 20 years of engineering and research expertise in non-halogenated flame retardant compounds, offers a range of fire performance polypropylenes for electronics and electrical engineering applications. The company's PIN polypropylene moulding compounds use phosphorus and nitrogen based flame retardants to ensure low smoke emission and low smoke toxicity and low corrosion in processing. UL94-V0 (1.5mm) fire performance is achieved. Different compound specifications offer also glow wire test fire performance (GWIT:750/3.0 and GWIF:960/3.0 or GWIF:850/3.0), weather resistance, high toughness or high rigidity. Applications include electrical switch and component structures, flexible tubing, light holders, loudspeakers, electrical plugs and electrical goods external housings.

“Devoted in halogen free flame retardant compounds industry”
<http://www.polyrocks.net/zuranpp.html>



Other News

California bans TDCPP and TCEP in children's sleep products: the first product regulation under California's Safer Consumer Products regulations came into force in July 2017, banning two chlorinated FRs (TDCPP and TCEP) in children's sleeping products, including nap mats, cots, playpens, sleep positioners, travel beds.

California Department of Toxic Substances Control "New Rule for Children's Nap Mats", 7th July 2017 http://www.dtsc.ca.gov/PressRoom/upload/News-Release-New-Rule-for-Children-s-Nap-Mats_Final-Version.pdf and http://www.dtsc.ca.gov/SCP/Childrens_Foam-Padded_Sleeping.cfm and home page <https://dtsc.ca.gov/SCP/index.cfm>

California notifies intent to list TBBPA as known to cause cancer: California's Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) has published notification of the intention to list TBBPA (tetrabromobisphenol A) as "known to the state to cause cancer" under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). This follows classification of TBBPA by IARC (International Agency for Research on Cancer) as Group 2A "probable carcinogenic to humans" because of sufficient evidence of carcinogenicity in animals (Grosse et al [2016](#)). Public comment is open to 31st July.

"Notice of Intent to List N,N-Dimethylformamide, 2-Mercaptobenzothiazole, and Tetrabromobisphenol A", 30th June 2017, California OEHHA <https://oehha.ca.gov/proposition-65/cnr/notice-intent-list-nn-dimethylformamide-2-mercaptobenzothiazole-and>

"Carcinogenicity of some industrial chemicals", Rosse et al. 2016, The Lancet, [http://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045\(16\)00137-6.pdf](http://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045(16)00137-6.pdf)

US EPA rejects petition asking for testing of chlorinated FRs: the US Environmental Protection Agency has rejected a petition (under Section 21 of TCSA, see pinfa Newsletter n°77) from six NGOs requesting hazard and exposure testing of three chlorinated phosphate ester flame retardants (TCEP, TDCPP and TCPP) and one brominated FR (TBBPA). EPA concluded that the petitions failed to provide sufficient evidence that the data already available to EPA are inadequate to evaluate the health and environmental impacts of these substances.

EPA rejection of petition on TBBPA [10th March 2017](#) and for chlorinated phosphate esters (CPE) [12th April 2017](#)

Publisher information:

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For abbreviations see: www.pinfa.org