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FRX Polymers® to Highlight Expanding End-Use Applications for Nofia® Flame Retardants at K 2016

CHELMSFORD, Mass., September 27, 2016 - FRX Polymers, Inc. (FRX), the global leader in polymeric halogen-free flame retardant solutions, will focus on its latest material developments and the expanded range of end-use applications at the K 2016 exhibition, which runs Oct. 19-26, in Düsseldorf, Germany. In Hall 5/C06-1, FRX will highlight its highly successful application development work in key markets such as electronics, textiles, building and construction, and transportation.

FRX Polymers has developed a game-changing product line of polymeric and reactive additives to address the global need for non-halogen flame retardant plastics. After extensive product development work and the opening of a full-scale commercial manufacturing facility in Antwerp, Belgium, FRX has expanded its global footprint for Nofia flame retardants (FRs) and embarked on an ambitious application development effort. “It’s an exciting time because our enabling technology is successfully being adopted in a wide range of applications for FR polymers,” said Marc-Andre Lebel, President and CEO of FRX Polymers.

The latest commercial applications demonstrate the value-added benefits of the company’s Nofia FRs. Among the key “firsts,” is the use of Nofia FR in PET staple fibers, fully- drawn yarns, textured drawn yarns, and monofilaments for synthetic hair and industrial applications. Prior to the introduction of Nofia phosphonates, phosphorus-based additives could not be added at sufficient levels to achieve the required FR performance for a non-halogenated PET monofilament. Nofia FRs have both replaced a halogenated solution and provided advantages in specific gravity and texture. South Korea’s Uno & Co. Ltd., the second largest PET monofilament supplier to the synthetic hair

industry, has introduced UnoEco and SF Remy synthetic hair fibers that incorporate Nofia phosphonates as the FR additive which is further processed into wigs and weaves. Nofia FRs also provide the opportunity for FRX customers to explore adding higher levels of the FR in a variety of PET textile fibers and nonwovens which wasn't possible before.

Another key advancement is Nofia phosphonates' suitability in thin-wall applications in film and injection molding. Nofia FRs can deliver both flame retardancy and transparency for a range of applications unlike other competitive non-halogenated additives. In a non-halogenated FR polycarbonate, Nofia copolymers help to achieve a thin (<1.0 mm), clear V-0 material. Nofia copolymer is currently used in a 0.8-mm-thick window for a valve assembly which is rated UL 94 V-0 and is in testing in a number of transparent applications requiring 0.4 mm V0. In addition, Nofia phosphonates have high-flow properties, making them ideal for these thin, clear applications.

Nofia phosphonates are also being used as the FR additive of choice in PET foam for structural panels used in mass transportation and building and construction markets. Nofia FR does not disrupt the foaming process and can be successfully applied to virgin and recycled PET.

In highly-filled polycarbonate applications in electronics and transportation applications, Nofia polymers show excellent adhesion to glass and carbon fibers which allows the composite to retain outstanding mechanical properties while delivering excellent FR properties. Higher levels of reinforcements are possible with little to no impact on properties when using Nofia phosphonates.

Nofia FR has also made strong inroads in copper clad laminates (CCLs) which are used as the circuit board substrate in today's electronics applications. OEMs are leaning toward non-halogenated circuit boards while the performance requirements continue to push the limits of this technology. FRX has worked closely with China's Shengyi Technology Company to jointly develop a new copper clad laminate (CCL)



product, based on FRX Polymers' Nofia FR hardener system, which delivers an order of magnitude lower dielectric loss (Df) while also increasing the CCL's modulus and reducing its coefficient of thermal expansion (CTE) compared to current commercial halogen-free systems. In addition, the Nofia system delivers outstanding FR properties, peel strength, and durability. Nofia reactive oligomers achieve this performance because they are used as hardeners and are therefore reacted into the epoxy during the curing process. In addition, they demonstrate good affinity for inorganic additives.

Furthermore, Nofia oligomers are being used in unsaturated polyester applications in building and construction and transportation. These oligomers deliver numerous benefits over competing non-halogenated FR additives which have limited use due to the plasticizing effect on the thermoset system which affects surface hardness and curing. Nofia oligomers are being successfully formulated in both transparent and opaque applications where aesthetics and weight reduction are key performance requirements.

Nofia phosphonates, FRX Polymers' polymeric and reactive oligomeric halogen-free flame retardant solutions, replace halogenated flame retardants, which are being phased out due to toxicity concerns. Nofia phosphonates are produced using sustainable green chemistry principles such as a solvent-free production process, no waste by-products, and near 100% atom efficiency. FRX Polymers' portfolio includes an extensive and growing patent estate. To date, the company has nearly 200 patent applications, of which more than 100 applications have been granted. The company has been the recipient of numerous awards, including the EPA's Environmental Merit Award, the Belgium Business Award for the Environment, and the Flanders Investment of the Year Award. FRX Polymers was recognized three times on the Global Cleantech 100 list, and has been a three-time Frost and Sullivan Award winner for Innovation and Customer Value Leadership.

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About FRX Polymers

FRX Polymers, Inc. was founded in 2007 following more than five years of intensive research and development in the field of halogen-free polymeric flame retardant blend components. The company operates a pilot plant in Chelmsford, Mass. and a full-scale commercial plant in Antwerp, Belgium. FRX is in the high-growth phase of its evolution. It is commercializing a novel family of halogen-free, transparent, high melt flowing, polymeric and oligomeric flame retardant solutions. FRX Polymers is headquartered in Chelmsford, Mass. For more information, visit <http://www.frxpolymer.com/>.

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