ELYSA – ELectrically Conductive Fire SAfe Polymers

The objective of this project is to obtain new environmentally sustainable and commercially viable fire safe, electrically conductive bio-based polyurethanes materials to substitute halogen containing polymers, e.g. soft Polyvinyl chloride (PVC), in demanding applications. ELYSA addresses the technical markets of, for example, clean rooms, data centres and heavy duty applications such as industrial plants and oil platforms. The consortium aims to realize halogen-free UL94-V0 (no burning) polymeric materials with electrical resistivity ≤ 1000 Ω·cm exploiting synergisms among additives, material structure and process.

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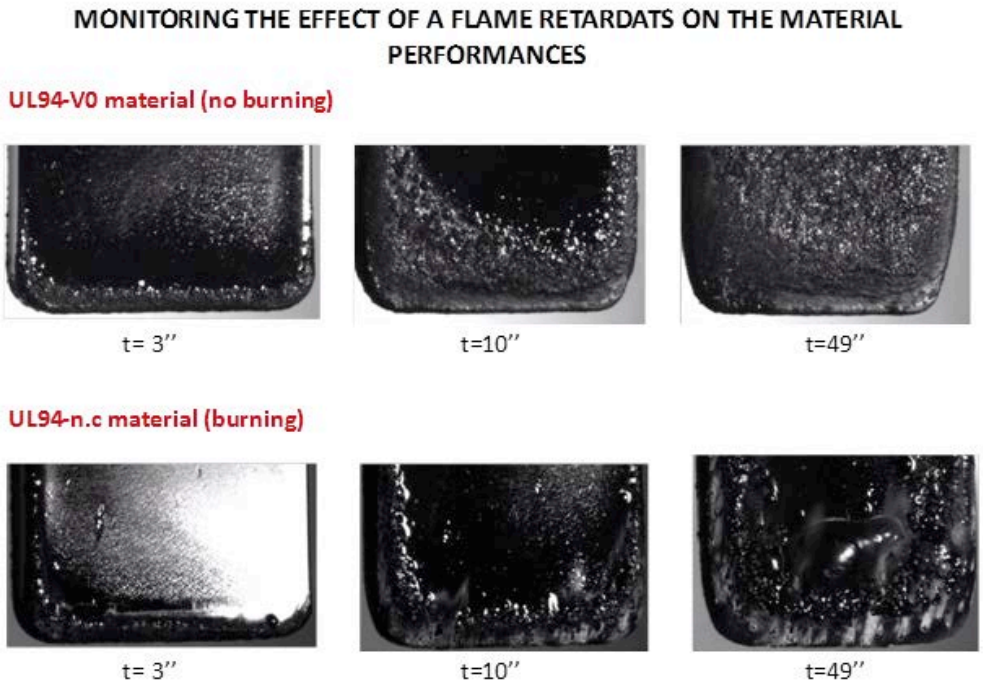
In a number of applications (e.g. clean rooms, data centres, industrial plants, nuclear plants and oil platforms), the risk of fires and explosion due to electronic discharge lead the stakeholders to use fire safe polymeric materials modified with electrically conductive fillers.

Fire-safe (UL94 V0) electrically conductive polymeric compounds provide static dissipative, ESD protection, EMI/RFI shielding and find applications in the electric and electronic markets as well as in ATEX environment such as piping, flooring, industrial plants, etc.

To achieve good balance among fire performance, electrical conductivity and mechanical properties soft (flexible) Polyvinyl Chloride (PVC) and halogen flame retarded polymers loaded with conductive fillers have been widely used, so far. However, in the last years halogen containing polymers, including PVC, have been subject to a hostile attitude of environmental and consumer organisations. Directives and legislations are leading to the elimination of some halides compounds from commercial goods. For example, the combination of the WEEE (2006) and RoHS (2002) directives has lead to the elimination of two effective classes of flame retardant, i.e. polybrominated biphenyls (PBB) and polybrominated diphenyls ethers (PBDE), from electrical and electronic equipments.
Additionally, the European Parliament, in its adopted report, is calling on the Commission to prepare a long-term strategy to make it more difficult or at the very least more expensive, for PVC producers to place their products on EU markets. Even if no important restriction to PVC has been released by governments world-wide, private companies such as Apple, Sony Ericsson, Nokia, HP, Acer, Samsung, Dell, Lenovo, Toshiba, Sony, Panasonic, etc. are progressively eliminating PVC from their products.

Stakeholder are therefore under pressure to develop new efficient and effective halogen-free polymers, providing a balanced set of properties, combining fire safety, electrical conductivity and mechanical characteristic, at a given price-range. This still represent a challenge in many technical sectors, where an effective substitute of PVC has not been found, yet. Beside the market attitude to reduce the use of halogen containing polymers, a positive trend related to the bio based polymers can be observed. In an effort to move away from petrochemical raw materials, both the Western Europe, North America, and Japan have developed guidelines that accord preferential treatment to products procured by public institutions that are classified as bio preferred and meet minimum renewable raw material content standards. Japan is also influencing the growth in bio plastics. In 2002 the Japanese government established the challenging goal that by 2020, 20% of plastics used in that country should come from renewable feedstocks, rather than traditional petrochemicals. Furthermore, 'greening' and 'sustainability' have become embedded in the long-term business strategies of major corporation's as well as small enterprises businesses. Industrial experts project that by 2012 demand for bio-based durable goods will account for almost 40% of the global bio plastics market. Currently TPEs are being targeted for

specialty development. Thermoplastic polyurethane (TPU), nylon 11, and copolyester elastomers are leading this bio-based charge in the 6.6 billion pounds (US$9.75 billion) 2008 global TPE market that will grow to 8.5 billion pounds by 2013 (US$15 billion). Volume growth will average 6% per year, with dollar value growth at 7.5% per year. Higher performance/value TPU systems account for roughly 15% of the total volume. The combination of safety and environmental issues defines a new market, opening business opportunities,
in applications such as, for example, paving and piping in demanding applications.



ELYSA materials during flammability tests.

ELYSA concept.