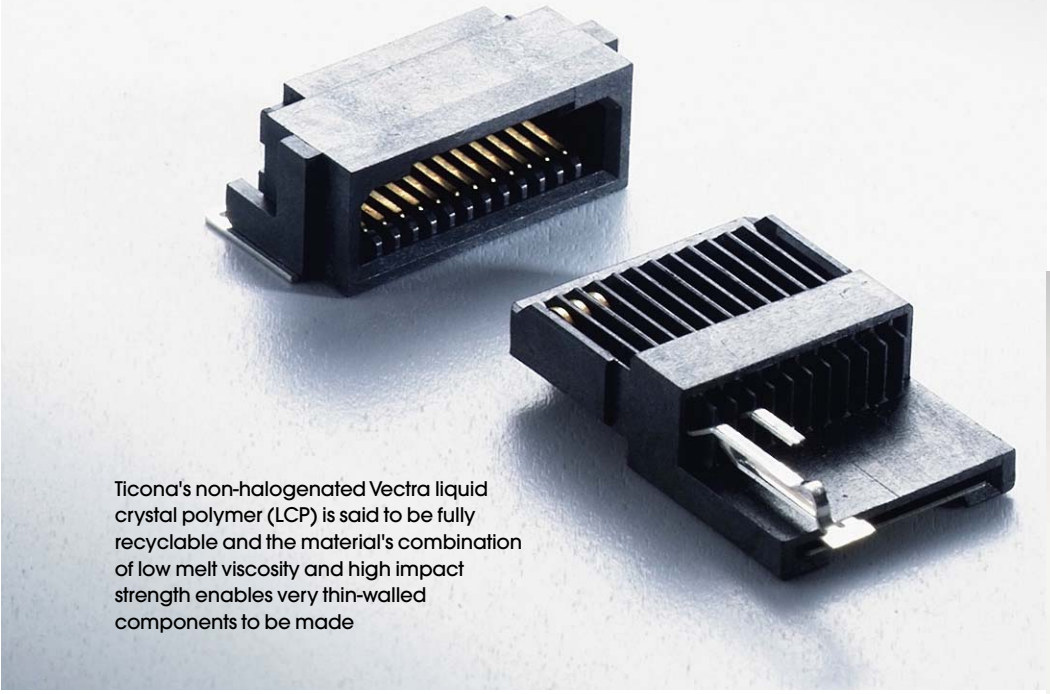
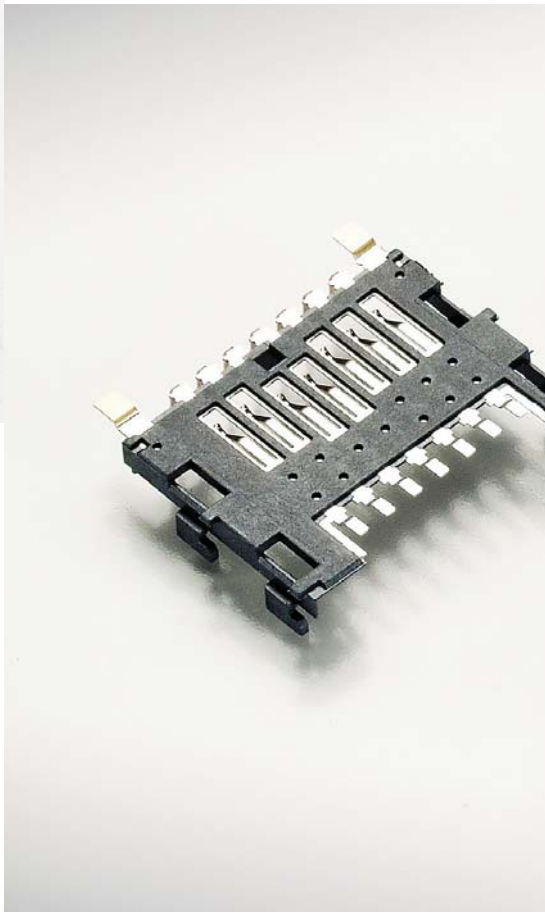
Green



Ticona's non-halogenated Vectra liquid crystal polymer (LCP) is said to be fully recyclable and the material's combination of low melt viscosity and high impact strength enables very thin-walled components to be made



Japanese materials firm Toray Industries (www.toray.com) and office equipment manufacturer Canon (www.canon.com) have developed a bio-based plastic, a new compound based on Toray's Ecodear PLA material platform, which achieves flame retardance for use in exterior parts for Canon multifunction office systems to be launched next year.

The new PLA compound is said to contain more than 25% by weight a plant-derived component that helps to reduce environmental burden.

Whereas bio-based plastic resins have not been able to perform as well as petroleum-based plastics in areas such as flame retardance, impact and heat resistance, and mouldability, the new Ecodear compound was able to realise improved material characteristics, particularly in the area of flame retardance where Ecodear is the world's first bio-based plastic material applicable for use in multifunction office systems to achieve 5V classification under the UL 94 flammability testing programme.

And compared with conventional plastic resins used, the new bio-based plastic developed by Canon and Toray offers an expected reduction in manufacturing-related CO_2 emissions of approximately 20%.

According to Canon, the development of the new bio-based plastic will further enable the replacement of petroleum-based plastics used for exterior parts, which require a high level of flame retardance — whereas the use of bio-based resins in office equipment products used to be limited to a few number of parts. Beginning next year, Canon intends to introduce multifunction office systems that incorporate the PLA-based material, with initial plans to use approximately 100 tonnes of the material each year.

Toray has had previous success in advancing the use of plant-based plastics in computer IT equipment in Japan. Back in 2005, Toray and Fujitsu developed the housing for a notebook computers made of plant-based plastics, where the material's heat resistance and flame retardance are improved via blending PLA and a non-crystalline plastic with a high glass transition temperature.

Besides bio-based materials, polymer resins derived in part from post-consumer waste are expected to play a bigger role for electronics manufacturers to establish 'green' credentials

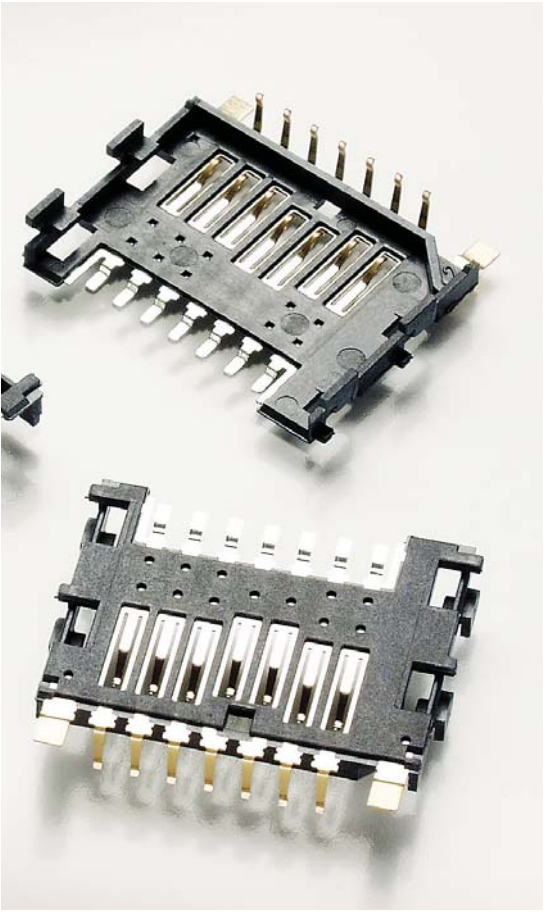
Electronics firm NEC (www.nec.com) is also at the bioplastics forefront, utilising a composite technology that cross links carbon fibre with a unique bio-based binder to achieve heat conductivity higher than that of metal. NEC says that with 30% carbon fibre content, the heat diffusion ability of the PLA composite is double that of stainless steel.

NEC has been working on performance enhancements for PLA, including the use of kenaf as a natural fibre reinforcement. Mass production of these bioplastic composites is said to start up by March 2009, where the material will be used in housings of electronics products and other new applications.

NatureWorks (www.natureworksllc.com), the joint venture between Cargill and Teijin, is working with industry partners to further extend the potential of PLA materials for use in electronics applications.

Jeff Smith, NatureWorks technology director, says the new Ingeo 3251D grade of PLA is focused on the injection moulding market and has the material properties needed to

possibilities



Electrical and electronics OEMs are looking more and more into exploring environmentally friendly material options along with the clear shift away from using halogenated content — and material suppliers are on hand with the answer to such challenges

be used in some semi-durable consumer electronics applications, including heat resistance up to 55°C. Suitable for both clear and opaque applications, Smith also says the Ingeo 3251D polyactide biopolymer grade is able to replace incumbent styrenic resins such as SAN, ABS and PS.

Smith also indicated how several key players in both the materials and electronics industry fields, including DuPont, Rohm & Haas, Arkema, Alcan and NEC, have developed solutions to enhance the performance of Ingeo biopolymer, while compounded material blends containing PLA have gain a certain market acceptance as well.

"NatureWorks does not offer compounded grades at this moment but a number of our current customers have developed Ingeo-based compounded solutions," Smith says. "These compounded solutions have been designed to enhance certain properties in order to meet specific electronics requirements."

In a conference recently held by NatureWorks centering on bioplastics innovation, Toray discussed their initiative for improving flame retardance as a key enabling technology for electronics housing applications. Toray's Michiuyki Nakase showed how the firm had achieved the highest UL94 V-0 flame retardant level for Ingeo, with the use of specific phosphate type-flame retardant and carbonising layer formation agents.

Toray's enhanced Ingeo-based resins have been adopted by Pioneer for the front panel of their DVD drives introduced in Japan and neighboring countries in mid 2008.

Sparking new ideas

On the engineered materials front, polymer maker Ticona (www.ticona.com) is taking the environmental product agenda a further step forward with the development of halogen-free liquid crystal polymer (LCP) resins for use in electronics applications — a material platform that the firm sees as being able to better address new environmental guidelines such as the Restriction of Hazardous Substances Directive (RoHS) and the Waste Electrical and Electronic Equipment Directive (WEEE).

Where manufacturers the likes of Nokia, Sony and Apple have already pioneered the move away from using PVC and flame retardant agents that contain halogens such as chlorides or bromides, Ticona now claims that some of the 'green' polymer components used by the industry do not offer enough of flame retarding functions.

Ticona's Vectra LCP portfolio is now positioned as a product that meets the basic requirements for "green electronics", a polymer that is inherently flame retardant while not requiring additional halogenated agents as additives and able to withstand continuous exposure to temperatures of up to 240°C and short-term exposure to temperatures of up to 360°C. Another advantage is that the polymer class is fully recyclable.

In terms of production costs, LCP is also considered by Ticona to be attractive for the electrical and electronics industry as its combination of low melt viscosity and high impact resistance makes it possible to create very thin-walled connectors, allowing for material savings and further part miniaturisations.

Ticona also added a non-halogenated thermoplastic polyester (PBT) to its portfolio of XFR halogen-free flame retardant polymers, where the enhanced Celanex 6842 series offers improved processability and equiva-

NatureWorks says compounded material blends containing its Ingeo biopolymer grade are gaining market acceptance for electronics

Facilitating design differentiation and sustainability, Sabic materials have been validated in several key components of notebook computers

lent properties for the use of designers and manufacturers in eco-friendly electrical and electronics components.

Ticona's Celanex XFR grades are said to help customers comply with hazardous substance restrictions and waste directives such as RoHS and WEEE.

"The new Celanex XFR PBTs from Ticona are V-0 and RoHS compliant with a proprietary flame retardant system that will allow our customers to use them as a virtual 'drop in' replacement for most similarly available PBTs without having to modify designs, build new moulds or make significant tooling changes," says Jeanne Pilis, Ticona polyester product marketing manager. "In addition, the new Celanex XFR series is available in filled and unfilled grades that match the flow and toughness of our brominated FR series."

Ticona's US plant in North Carolina received Green Partner certification from Sony Corporation, the global consumer electronics company. Sony designates Green Partners based upon a supplier's cooperation in the production of eco-friendly products and their ability to meet established regulations for environment-related substances found in components of products that bear the Sony name.

"As a solutions-driven company, Ticona is pleased that its U.S. manufacturing facility is a certified member of the Sony Green Partner Program," says Tom Hannigan, Ticona leader, quality management, Americas. "This designation underlines our commitment to provide customers with a broad product line of engineering polymers, including Vectra LCP that enables them to develop eco-friendly innovations that can meet their requirements and comply with industry standards."

Design and sustainability

The electrical and electronics sector is the largest market segment for the range of materials developed by Sabic Innovative Plastics (www.sabic-ip.com), and the firm is specifically addressing industry trends such as part miniaturisation and demand for design differentiation along with eco concerns.

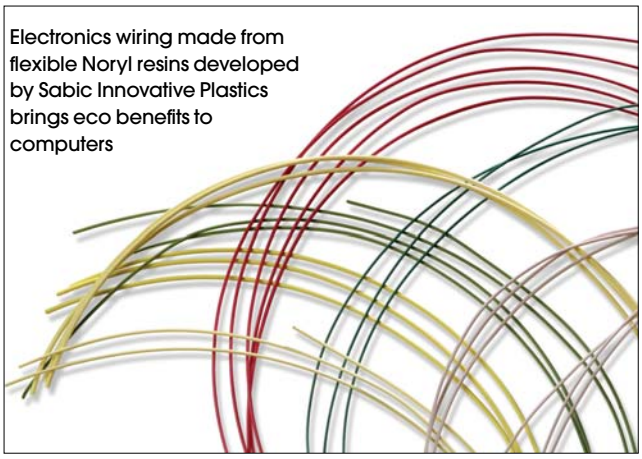
The Valox iQ and Xenoy iQ range of engineered resins, derived in part from post-consumer waste, are seen as a platform to help electronics manufacturers to become more environmentally compliant. The Sabic materials have been validated in several major internal computer components such as cooling fans, heat sink shrouds, connectors and external bezel covers.

"Valox iQ resins aren't just good possibilities for greener electronics — they have already been used commercially in computer cooling fans," says Hiroshi Yoshida, Sabic Innovative Plastics global market director for electronics. "In addition, we're expanding the iQ portfolio to encompass other environmentally responsible materials such as Xenoy iQ blends of amorphous polycarbonate and semi-crystalline PBT resins, a good option for housings and bezels."

Derived in part from post-consumer plastic waste such as PET bottles, Valox iQ PBT resins use proprietary flame retardant technology that comply with environmental regulations such as the WEEE directive.

Besides the iQ material platform that complements the industry's drive towards sustainability, Sabic Innovative Plastics has a range of other products that delivers in terms of design and performance in the fast-paced electronics sector in Asia.

"There is a general shift of product design capabilities in the electronics market to Asia, where we see a lot of new ideas and R&D work for notebook PCs, as an example, being done in Taiwan," Yoshida says. "We see ourselves playing a role of understanding and identifying emerging industry trends ahead of the market."



Electronics wiring made from flexible Noryl resins developed by Sabic Innovative Plastics brings eco benefits to computers

The Gemstone design concept developed with Acer (www.acer.com) for its Aspire line of notebook computers is one of the recent electronic application successes that best exemplifies some of the trends Sabic Innovative Plastics has identified — replacing metal with plastics, thinner and more lightweight design, environmental considerations, and product differentiation through aesthetics.

Lexan 9945A polycarbonate resins from Sabic proved to be integral to the holographic cover design used on Acer's redesigned Aspire line. For an elegant and sophisticated look, the Gemstone design features subtle use of curves and a shiny, pearlescent black cover — with the Acer logo 'floating' in the centre like a holographic projection.

"We are definitely seeing more of such differentiated designs in electronics, combining transparency with the right colour touches," Yoshida adds.

Acer required a clear material that could be utilised with in-mould decoration (IMD) technology to achieve the multi-dimensional look. The high-clarity Lexan 9945A resin not only offered non-halogenated flame retardance for this application — compared to standard polycarbonate, the Sabic material's high flow properties better support thin wall mouldings.

The thin wall part, enabled by the high flow Lexan resin with its 1.8mm UL 94 VO flammability rating, reduces the weight of the notebook, making it easier to carry, while the material's high impact strength and stiffness help protect the delicate electronics.

Makers of consumer electronics can likewise gain significant eco benefits from using Sabic's flexible Noryl resins to replace PVC for electronic wiring, delivering the flexibility and processing performance of PVC while adding advantages of halogen-free flame retardance, lower specific gravity and improved abrasion resistance.

Yoshida highlights Noryl's application success for mobile phone cables as an example for the material's potential: "Mobile phone companies have taken the lead to stop using PVC in recent years, and flexible Noryl resins have proven to be one of the strongest non-PVC cable materials in this particular segment."