Innovative Fire Insulation Technology for Nexans Olex

Fire-resistant products maintain building safety system operations during fires

An Australian polymeric cable coating that transforms into a fireproof ceramic in a blaze maintains the integrity of electrical circuits for alarms, pumps and fans vital for safe evacuation and fire fighting.

An innovative response to a technical challenge

Ceramifying polymers for use in fire-resistant electric cables were developed into market ready products by CSIRO and Olex, after the concept was envisaged by Olex, CSIRO and its partners within the Cooperative Research Centre (CRC) for Polymers.

Ceramifying polymers have a host of potential applications in fire prevention in buildings, ships, vehicles and industrial and defence equipment.

The story began when Olex Australia challenged the multidisciplinary CRC for Polymers team to design a revolutionary fire-resistant electrical cable that could keep electricity flowing in a fire at temperatures above 1,000°C.

In the event of a fire, the cable’s self-supporting ceramic insulation maintains the integrity and continuity of circuits for building safety systems. Unlike existing cables, it does not collapse.

The solution was to combine the properties of a polymer with those of a ceramic, allowing the standard operation of the system under normal conditions, while transforming to a ceramic in the event of a fire. As the polymer melts and disintegrates in the heat, at the same time the ceramic forms a solid protective insulating layer, preventing short circuits and enabling circuit integrity.

During a fire, the cable’s ceramic insulation maintains the integrity and continuity of circuits for building safety systems such as emergency lighting, alarms, pumps and fans that are vital for safe evacuation and fire fighting.

CSIRO’s Mr Nick Rigopoulos and Dr Donovan Marney with the high-performance pyrolex multicore cable, developed with Olex (a Nexans Company).
All of the materials in the Infit™ cable have low calorific value, which prevents spreading or promotion of fire via components of the cable, as is the case with normal polyethylene. To minimise smoke and hazardous gas emissions, the cables are free of halogens. They are also free of lead, antimony and any other hazardous ingredients.

Commercial outcomes
In 2006, Olex Australia was acquired by the global energy cable company, Nexans, and became Nexans Olex. The project benefitted greatly through the placement of a CSIRO researcher within the Nexans Olex manufacturing environment. CSIRO continues to work with Nexans on new product development.

Ceramifiable polymer technology helped Nexans Olex secure a $10 million contract to supply over 1,100 km of electrical cables to the Brisbane Airport Link project. Nexans Olex’s Alsecure® premium range of ceramifiable cables will be used in the project’s road tunnels.

Nexans Olex employs more than 700 staff in Australia and New Zealand, and as a part of Nexans international network, is represented in sales offices and distribution centres throughout the Asia-Pacific Region.

The fire resistant cable technology has led to the creation of over 60 new products since 2005, providing a boost to local jobs as well as supporting Australian exports to Europe and the replacement of imports from USA and Europe. It has generated annual earnings worth millions of dollars, and total earnings worth tens of millions of dollars.

The technology also led to the formation of Ceram Polymerik in September 2004, a company which develops products specifically for passive fire protection.

The $12 billion global passive-fire protection market includes applications in oil rigs, cargo ships, office blocks and other public buildings. Worldwide, fire accidents cause more than 70,000 deaths and $115 billion of property damage a year.

Applications
Potential fire-protection applications of the composites include:
- compounds for extrusion or injection moulding
- door and window components
- gap seals for concrete wall panels
- ducting and building penetrations
- structural steel protection
- fire protection in marine and transport
- partitions, ceilings and wall linings
- equipment security
- fire barriers for material storage
- protection from incendiary devices.

Partners
The collaborative partners in the project were:
- Nexans Olex
- CSIRO

Early stage scoping research was undertaken through the CRC for Polymers by:
- Monash University (ceramics expertise)
- University of New South Wales (polymer and other materials expertise)
- Defence Science and Technology Organisation (fire performance)
- RMIT (polymer expertise extending the technology to non-cable applications).
- CSIRO (Fire science, polymer and ceramics science)
- Olex Australia (Project direction, product definition, evaluation, production, marketing, sales)

Conducting cable testing at Nexans Olex commercial manufacturing facility.