Canadian Aeronautics Networking Programme for Europe

Case Study - INNOSHADE

A Brighter Future for Shading

CANNAPE (Canadian Networking Aeronautics Project for Europe) is an EC-funded project, aimed at creating a platform for enhancing aeronautics and air transport research and development (R&D) cooperation between Europe and Canada, and to explore the potential for and, where appropriate, to promote the participation of Canadian stakeholders with their European counterparts in common activities.

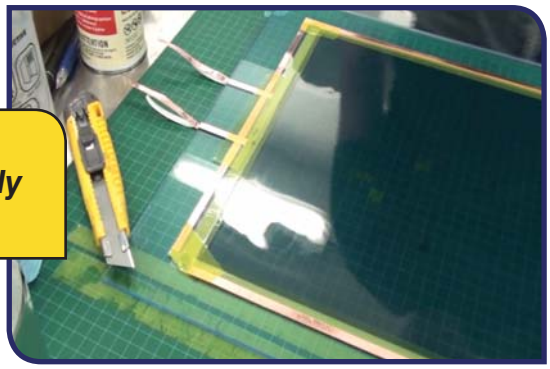

Fig 1: Prototype device assembly in dry room

A Bright Future for Shading - The Innoshade Project represents a breakthrough in smart shading technology which will lead to greater passenger comfort in aircraft, as well as having applications in other sectors.

Project Background

The INNOSHADE project constitutes a breakthrough in smart shading technology by overcoming common limitations of state-of-the-art electrochromic devices. It shall enable the low cost production of electrochromic shading appliances with lower energy consumption and faster response. The overall objective of the project is to scale up and study the underlying nanotechnology-based processes from laboratory to pilot line production, with the major goal to explore and extend the application potential by creating interest in several prospective user groups across sectors. This project uses multiple technologies such as conducting polymers, thin films, transparent electrodes, nanotechnology, roll-to-roll processing, and spectro-electrochemistry. Basically, it involves coating of multi thin layers of different chemical materials over a conductive plastic substrate. The degree of shading can be controlled using a low-voltage source. Consequently, the application areas span from sunroofs for cars, sunglasses and appliances (fridge and oven windows) to aircraft cabin windows.

Electrochromic technology, at the heart of the INNOSHADE project, will enable the controlled adjustment of the tint of the device to darker or lighter shades in the presence of sunlight. It can also be used to tint other things of small to moderate area, such as oven and refrigerator doors and aircraft cabin windows. At the end of this project, the consortium succeeded not only to produce complete devices having the required performance but also worked on the conception of suitable pilot-line processes to make this technology available in-line, and linking the R&D development to the commercial aspect. All processing and production steps have been optimised in terms of energy, environmental impact, and occupational safety based on life cycle assessment data.

International Reputation

IREQ was approached to join the project because of an exceptional expertise in battery technology; they had developed a polymer separator for Lithium-ion batteries, which was relevant to the electrochromic technology as well. They also have sound expertise in a large range of materials and technologies related to the battery field, which was crucial for the success of this project. The IREQ materials are already recognized worldwide in the fields of transportation electrification and energy storage. The electrochromic prototype devices are generally prepared in the dry room in IREQ. Two times a year, the IREQ group welcomed two of their overseas partners to working sessions for prototype assembly; Fraunhofer Institute ISC in Germany represented by Dr. Uwe Posset, Project Coordinator, and Mr Matteo Salamone, researcher of the University of Milano-Bicocca in Italy.

Prototypes of this technology exhibited an extraordinary cycling stability of 120.000 cycles without appreciable degradation (testing under laboratory conditions), showing consistently homogeneous colouration and high contrast. All members of the consortium have made contributions to this success.

The chief IREQ collaborators in the INNOSHADE project are researcher Dr. Abdelbast Guerfi, expert chemical technician Jean-François Labrecque and chemical technician Martin Dontigny. They work under the Energy Storage and Conversion Department, managed by Dr. Karim Zaghib, who heads the team devoted to developing advanced materials for lithium-ion batteries.

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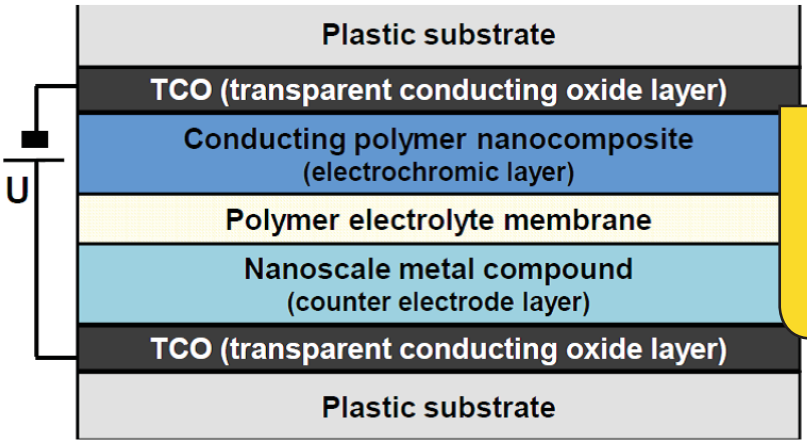

Fig 2: The INNOSHADE device components are listed to the left

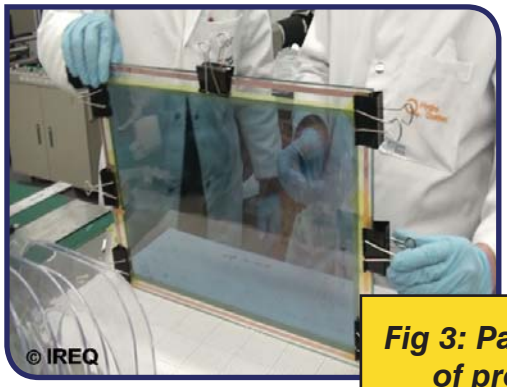

Fig 3: Packaging of prototype device in dry room (right)

Fig 4: In-line Electrochromic film preparation (right)

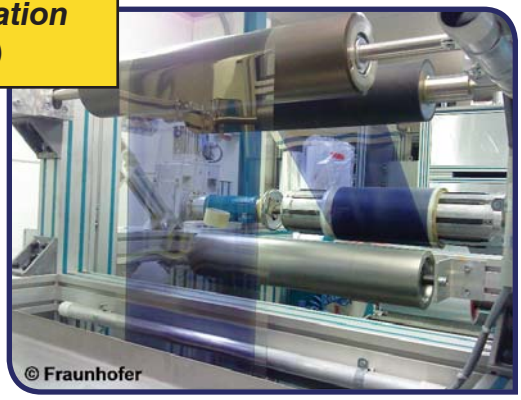

Fig 5: A proto type of electrochromic device at the beached state (left) and colored state (right) in the dry room at IREQ

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