Heterogeneous integration of autonomous smart films based on electrochromic transistors

www.smart-ec.eu

COOPERATION

SMART-EC

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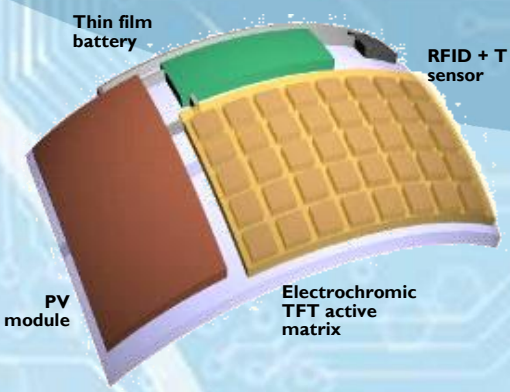
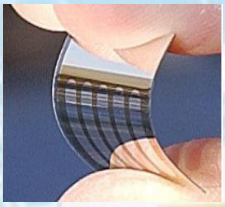
Objectives

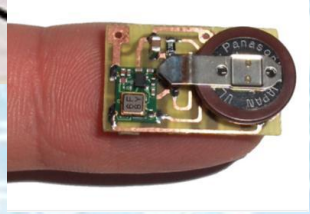
SMART-EC is a large scale FP7 ICT project started in September 2010. Its goal is to develop multifunctional smart devices and films based on an electrochromic (**EC) thin film transistor matrix** to implement fast and stable devices that can be used for commercial EC smart products, for instance in the automotive, ID-card and smart packaging sectors.
Radical, low-cost innovative manufacturing technologies on large-area PVD and inkjet inner roll-to-roll process using low-cost plastic materials will be developed. These processes are suitable for the heterogeneous integration of multiple functions to produce autonomous devices (thin-film battery, photovoltaic cell, sensors and communication) with considerable added value compared to traditional solutions.



Specific Activities

- **End-users requirements and design of devices** for ID-cards, packaging and automotive
- **Reliable deposition and patterning** of organic/inorganic materials on flexible substrates
- **Development of building blocks and integration in sub-systems** (**EC thin film transistor**, **energy harvesting and storage** and **RF antenna**)
- **Low cost and high throughput heterogeneous integration** for multifunctional system
- **Smart multifunctional demonstrators' validation**





Latest events

KICK OFF MEETING

The first technical and management meeting of SMART-EC project was held the 23rd – 24th of September 2010 in Orbassano (Turin – Italy) at FIAT Research Center.

M6 MEETING

The M6 technical and management meeting was held the 10th – 11th of March 2011 in Caparica (Lisbon – Portugal) at UNINOVA. The meeting was really well organized by Luis Pereira and all the UNINOVA team. Interesting and delicious discussions have been made in front of fresh fish and Cataplana.

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Technical Achievements

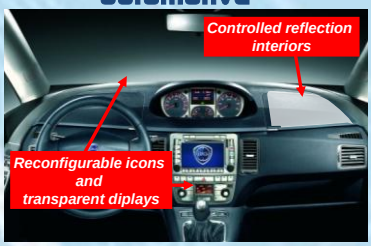
SP1 - Systems design and requirements

The first activity carried out was the collection of the end-users specifications to be converted in scientific objectives for research and design stages. The definition of electrical, geometrical and autonomy features represents a crucial step for the starting of sub-systems and systems design to finalize the prototypes. The requirements have been selected considering electro-optical, geometrical and autonomy properties. Every demonstrator is characterized by a typical assembling methodology which will impact on the selection of materials, substrates and processes. Testing conditions at application level have been selected and performed during the project.

The SMART-EC success will provide significant opportunities for numerous potential long-term innovations outside of those addressed in this project. Therefore applications of new autonomous lighting modules even transparent have been proposed using similar deposition, patterning and integration strategies.

A further activity started in the first 6 months of SMART-EC is the preliminary design of the different sub-systems to be developed as electrochromic, energy and communication devices. Developments that will be realized in next period should allow to affine and correct these specifications on the light of the obtained results.

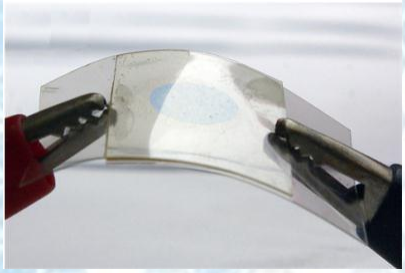
automotive



ID-cards

smart packaging

SP2 - Deposition technologies



The first efforts on materials development both through chemical and physical deposition was on electrode, electrolytes and TCOs materials for both EC devices and printed/thin film battery. Tests are being done in checking the ability of reversibly oxidize/reduce electrodes materials showing good results on EC test cells for both printed and sputtered layers.

On electrolytes the great challenge is on the development of a material that can be printed and then cured in order to become solid. This way a solid electrolyte using a cheap deposition technique will be possible.

Finally, TCOs are also being studied as alternative to conventional ITO or FTO that normally require substrate heating and/or post annealing in order to get nice electrical properties. IZO thin films are being also developed to be integrated in EC devices.

Upcoming Events

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M12 MEETING

The next technical meeting at M12 will be organized in Warsaw (Poland) on 22nd – 23rd of September 2011 in the frame of EMRS conference-

SMART-EC SYMPOSIUM at EMRS

SMART-EC symposium at EMRS conference 19th – 23rd September 2011 in Warsaw – Symposium L – "Towards lightweight, flexible and self sustained ion-based devices".
More information at **www.emrs-strasbourg.com**

JOINT WORKSHOP and SUMMER SCHOOL

Workshop at EMFT Fraunhofer in Munich 6th – 10th of June 2011 on "'Printed Electronics and Foil Assembly". Cross interaction initiated by COSMIC project between 5 EU projects (COSMIC, POLARIC, Interflex, SMART-EC and PRODI).
Further information at further **www.project-cosmic.eu/training**

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Consortium

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ROCKWOOD PIGMENTS

cemop UNINOVA

BUNDES DRUCKEREI

FCT FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

RG Plastiques GROUPE G-PACK

acreo

SOLEMS L'énergie lumière

cea liten

C-24 INNOVATIONS

Fraunhofer EMFT

BIOAGE

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