



# Project Presentation

Seitenstetten, 18/06/2014

# Executive Summary

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- EU-Call for “Smart Windows” in FP7-Programm
- Deadline: Dec. 1st, 2011
- EU-Targets:



Ug-Value	< 0,3 W/m <sup>2</sup> .K
Weight Reduction:	- 50%
Cost Reduction:	- 15%
Add. Functions:	Energy Harvesting, Light Guidance, Illumination, Noise Reduction, LCA

- Project Titel: “Ultrathin Glass Membranes for future multifunctional quadruple IG-unit Windows for Zero-Energy Buildings”

# Executive Summary



ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- 24 Proposals
- 4 Proposals selected for funding

[http://cordis.europa.eu/fetch?CALLER=FP7\\_PROJ\\_EN&QZ\\_WEBSRCH=EeB.NMP.2012-5&QM\\_PJA=&USR\\_SORT=EN\\_QVD+CHAR+DESC](http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&QZ_WEBSRCH=EeB.NMP.2012-5&QM_PJA=&USR_SORT=EN_QVD+CHAR+DESC)

- Total Project value: € 6.620.000.-
- Funding: € 3.998.535.-
- Project Start Date: Oct. 1st, 2012
- Duration: 42 Months

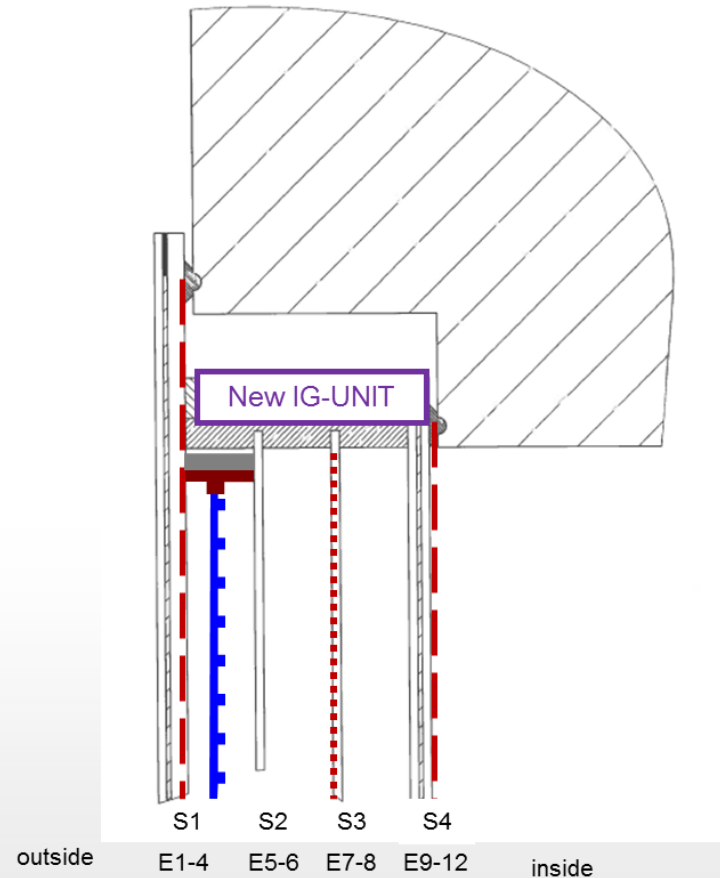
# Overall Project Objective

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

### Legend:

- S1:** Glass laminate with encapsulated OPV
  - S2, 3:** ultrathin Glass membrane (~0,9mm) with new quadruple compound
  - S4:** Glass laminate with encapsulated O-LED (optional)
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- E1:** Anti-reflection coating
  - E4/E5:** Solarthermal Collector
  - E7:** Micromirror for light guidance
  - E3, 7, 11:** transparent conductive layer (Graphene)
  - E4, 6, 8:** low-E Coating
  - E5, 7, 9:** Anti-reflection coating

→ final Prototype (1,23 x 1,48m)



# Project Partners



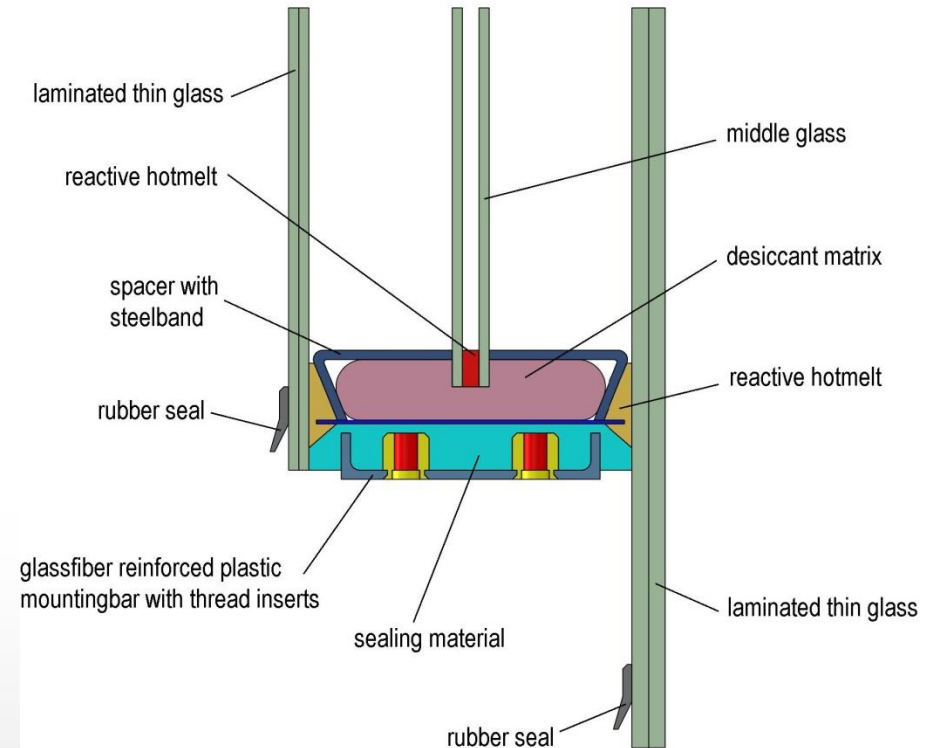
ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- LiSEC: Consortium Leadership, new IG-unit, Thin Glass, AR, Encapsulation
- Profactor: Operative Coord., Graphene, Micromirrors
- Belectric OPV: Integrated Organic PV
- Energy Glas: Integrated Solarthermal Collector
- Durst: Inkjet Printer for OPV and Graphene
- Tiger Coating: OPV-Ink and Graphene Ink
- Aixtron: Graphene Transfer Tooling
  
- Universities: CNR, IT | Univ. Linz, AT | Univ. Kassel, DE  
Univ. Cambridge, UK | Korea Univ., RK

# Technical Contents (1/7)

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- WP 2: new IG-unit (LiSEC)
  - Quadruple Design
  - Tempered Thin Glass (~ 0,9mm)
  - AR-Coating
  - misc. Machinery (Prototypes)

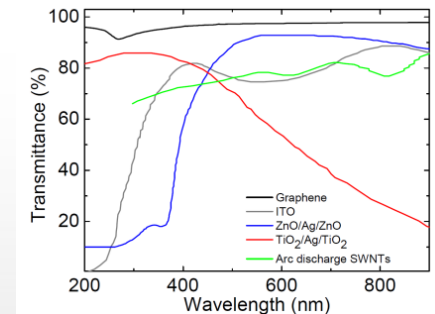
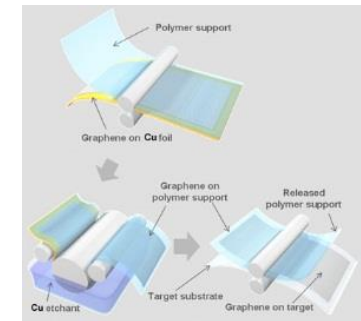
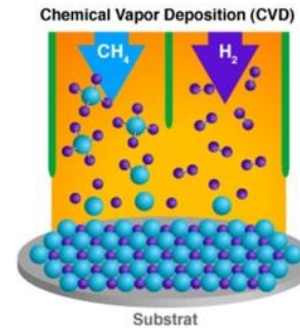


→  $U_g < 0,3 \text{ W/m}^2\cdot\text{K}$ ; weight reduction: 50%

# Technical Contents (2/7)

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- WP 3: CVD-Graphen (PRO)
  - CVD Process (CNR)
  - Transfer process (PRO)
  - Transfertooling (AIX)
  - Charakterisation (CAM, JKU)

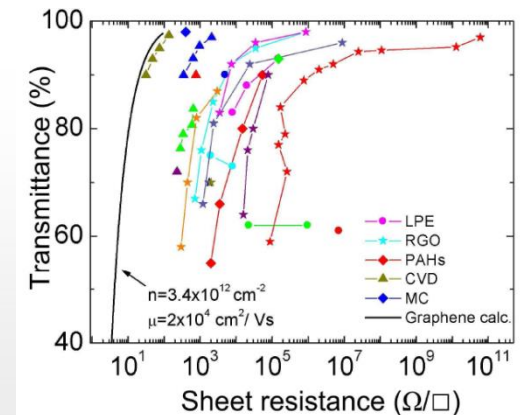
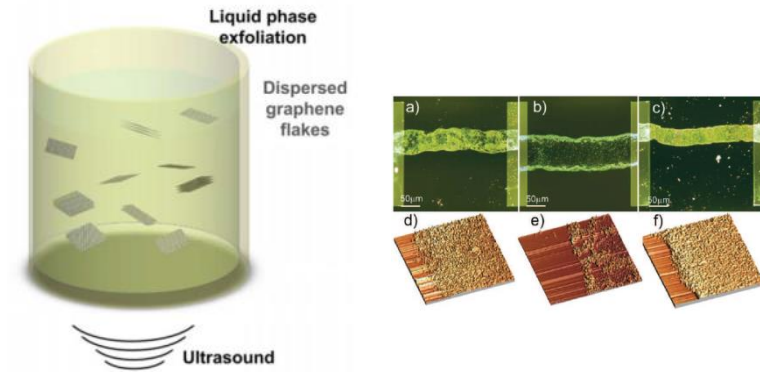


→ Area resistance min.  $20\Omega/\square$ , Transparency min. 90%

# Technical Contents (3/7)

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- WP 4: Graphen Ink (PRO)
  - Production Process “lab-scale” (CAM)
  - “mid-scale” (PRO)
  - “large-scale” (TIG)
  - Charakterisation (DUR, CAM, JKU)

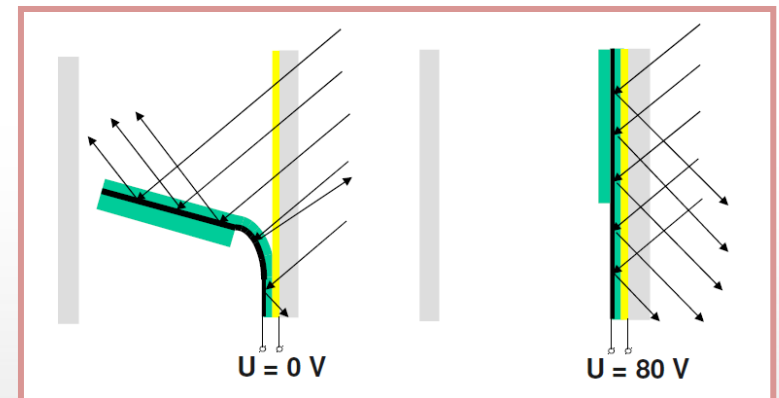


➔ Mobility min. 50  $\text{cm}^2 \text{ V}^{-1} \text{ s}^{-1}$



- WP 5: Micro Mirrors (Uni-Kassel, PRO)
  - Array-Setup, Functionality (Uni-Kassel)
  - Microstructuring (Profactor, Uni-Kassel)
  - Graphen (CAM, CNR, PRO)
  - Integration (PRO, LiSEC)

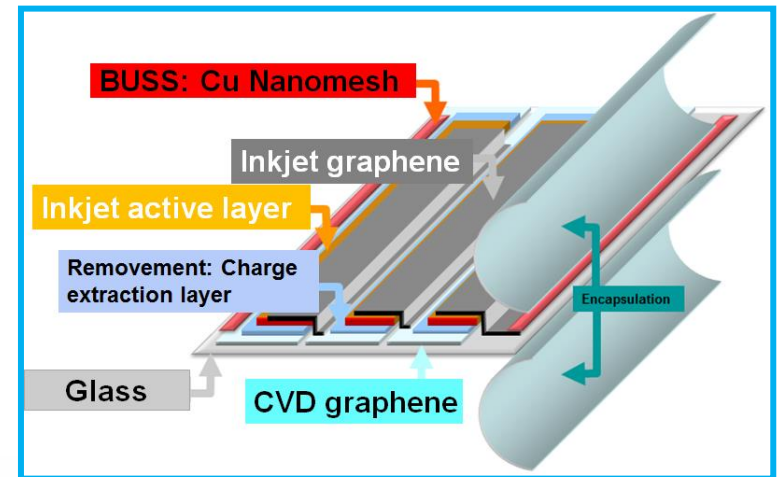
→ Ranging from 75% to 2% Transmission



# Technical Contents (5/7)

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- WP 6: Organic PV (BEL)
  - Module Design, Functionality (BEL)
  - OPV-Ink (PRO, TIG)
  - InkJet-Printer (DURST)
  - Graphen (CAM, CNR, PRO)
  - Cu Nanomesh (KU, PRO)
  - Glass-Glass Module (LiSEC)

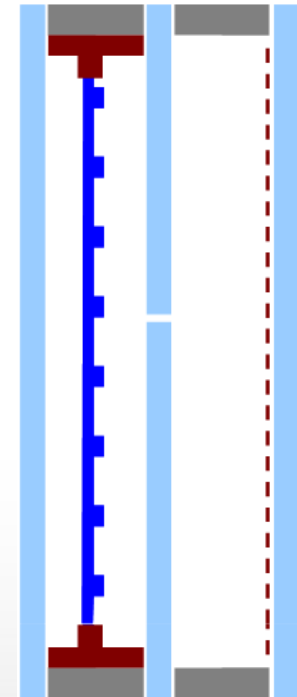


→ Efficiency min. 6%; increased lifetime

# Technical Contents (6/7)

## ADVANCED TECHNOLOGIES FOR SMART WINDOWS

- WP 7.1: Solarthermal Collector (ENG)
  - Design, Functionality (ENG)
  - Integration (ENG, LiSEC)



# Technical Contents (7/7)

- WP 7.2: OLED (Philips, PRO)
  - Module Setup, Functionality (Philips)
  - Graphene (CAM, CNR, PRO, AIX)
  - Integration (PRO, LiSEC)

