EUROPEAN COMMISSION

HORIZON 2020 PROGRAMME - TOPIC H2020-GV-05-2017
Electric vehicle user-centric design for optimised energy efficiency

GRANT AGREEMENT No. 769902

DOMUS

Design OptiMisation for efficient electric vehicles based on a USer-centric approach

DOMUS – Deliverable Report

Deliverable **D3.4**

Specimen of Body panel part and/or Dashboards part with SiO_2 superporous thermal insulation barrier

Deliverable No.	DOMUS D3.4	
Related WP	WP3 – Cabin thermal insulation solutions	
Deliverable Title	Specimen of Body panel part and/or Dashboards part with SiO2 superporous thermal insulation barrier	
Deliverable Date	30-04-2020	
Deliverable Type	REPORT	
Dissemination level	Confidential – member only (CO)	
Written By	Didier Arl (LIST) Jean Di Martino (LIST)	21-04-2020 21-04-2020
Reviewed by (if applicable)	Alberto M. Merlo (CRF)	2020-04-28 2020-06-05
Approved by	IDIADA	2020-06-05
Status	Final	2020-06-05

Change Log

Version	Modifications of document	Author	Date
1			

Disclaimer/ Acknowledgment

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769902. The information and views set out in this publication does not necessarily reflect the official opinion of the European Commission. Neither the European Union institutions and bodies nor any person acting on their behalf, may be held responsible for the use which may be made of the information contained therein.

Publishable summary

The objective of this task entitled "*Specimen of Body panel part and/or Dashboards part with SiO_2 superporous thermal insulation barrier*" was in line with the overall challenge of the WP3 which aimed at developing new cabin components, and systems for energy efficient, safe and comfortable future electrical vehicles (EVs).

The main objective was to develop a new type of thermal insulating barrier layer for door interiors panels and dashboard. The improvement of the global thermal insulation goes through a porous oxide layer deposited on a dashboard element. The incorporation of a thin nanoporous layer of SiO_2 with a targeted thermal conductivity of ~0.2 W/m·K should enable the improvement of the thermal assessment of the EVs as well as being a safe material for the environment and the human health.

The strategy which has been employed is to use a deposition technique which ensures a conformal deposition on high aspect ratio items. The selected technique was the Atomic Layer Deposition (ALD). LIST proposed its expertise in the non-conventional use of ALD through the development of a nanoporous silica film at room temperature ensuring then a compatibility with a wide range of substrates. The development has been done in two steps: firstly on flat samples to provide the conditions for detailed characterisations of the porous film. An additional task dealing with modelisation has been integrated in order to fit the non-classical nanoporous state of the film. Following an optimization step, the process has been transferred to 3D curved hollowed substrates. The proof of concept has been done on an air-duct plastic end-connector. Despite close thermal properties of the plastic and the porous film (~9nm diameter and >40% fraction), the results show a thermal insulation trend with a maximum decrease of 2-3°C at 50°C and also a slight kinetic effect.

The demonstrator obtained let suggest a significant positive impact of the nanoporous film on the overall thermal insulation if it were applied to larger sections of the dashboard. This task provide also some interesting perspectives to integrate the developed nanoporous films in a multi-material approach even by coating other junctions or insulating materials.