Application of thermally conductive plastics and a novel coating in Solar Thermal Panel Collectors (THERMALCOND).

Raquel LLorens- Chiralt[1], Amaya Ortega[1], Julio Gómez[2], Jon Lea[3]

[1]AIMPLAS, Plastic Research Institute,C/Gustave Eiffel, 4, 46980 Paterna,SPAIN
[2]AVANZARE, C/jardines 5 (Pol.Ind. Lentiscares) 26370 Navarrete (La Rioja),SPAIN
[3]Smithers RAPRA, Shawbury, Shrewbury, Shorpshire SY4 4NR,ENGLAND

rllorens@aimplas.es

Abstract

The main goal of ThermalCond project has been to develop a new family of low cost polyolefin based components (sheets, pipes and fittings) to be used in the manufacture of flat-plate solar thermal collectors. These components are a viable alternative to current collector´s metallic components. However, due to the current limitations of thermoplastic materials (low thermal conductivity and solar absorption) two main approaches have been followed in this project. New thermally conductive nanocomposites for sheets, pipes and fittings have been developed using conductive nanostructured materials such as graphene. The resulting compounds retain the processing and increase the performance properties of the original polymer. On the other hand, a novel and specific surface coating based on molecular self assembly (SAM) technology has been developed which enhances the conversion efficiency of the entire wavelength spectrum of solar incident into heat energy.
These developments allow a novel low cost and low weight components design´s with enhanced thermal conductivity and high solar energy absorption to develop high energy thermal collector designs. The use of plastics components instead of metallic ones offers additional advantages: folding and easy assembling structures design, reduced cost of material and manufacturing, weight reduction, corrosion resistance, low friction coefficient (less pump energy consumption), prevent theft or vandalism (due the low cost of components in comparison with copper).

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Figures

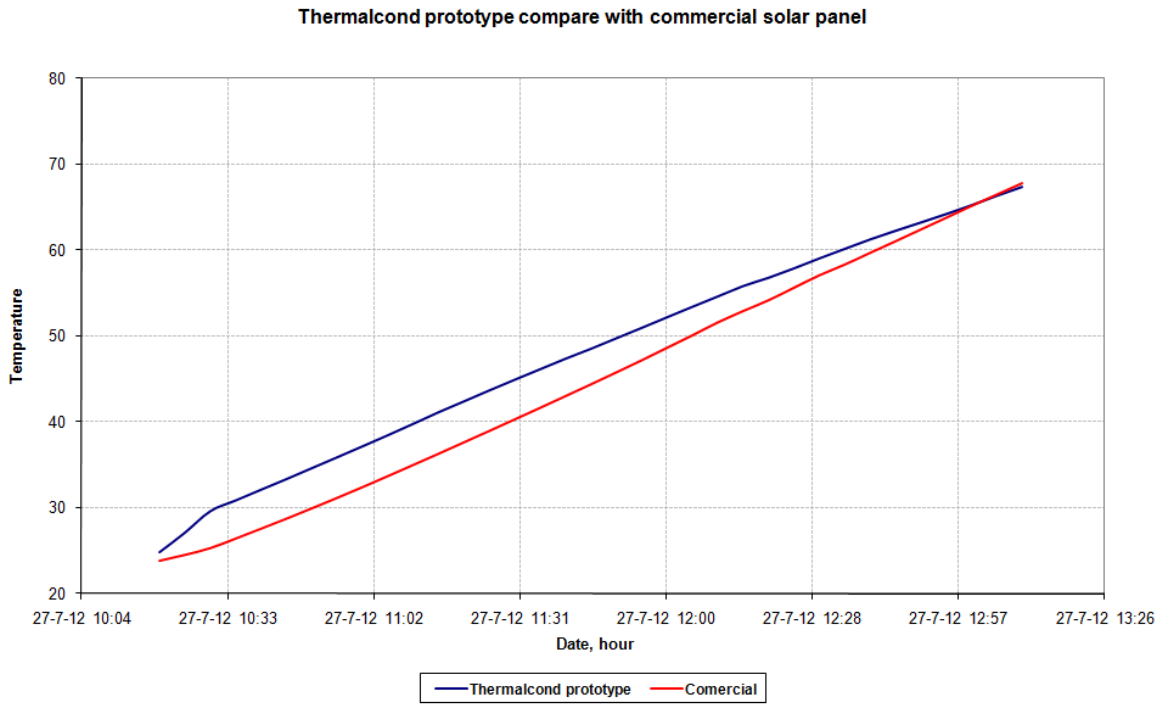

Figure 1. Thermal prototype compare with comercial solar panel.

Figure2. Lateral view: ThermalCond collector (left); commercial collector (right).