

LIMES

Light Innovative Materials for Enhanced Solar Efficiency

*Project Duration: 04.2014 to 03.2017.
05.2017*

Summary

Extraction of solar energy through solar cells is a promising technology for increasing the share of renewable energy sources, both now and in the future. Glass for solar cells constitutes a significant part of the cost, and is a necessity to develop to increase the life expectancy and to reduce the cost per watt recovered. In the LIMES project has glass with added optically active components which absorb harmful UV light and simultaneously convert those UV photons into visible light, been studied. Thus, the profit is twofold, increasing both lifetime and efficiency up to 4%. Further, increasing of mechanical and chemical durability has been studied by optimization of the glass composition. It has been shown that the developed glass composition has 3 times increased crack resistance and 4 times improved chemical resistance. Novel thermo-chemical strengthening of glass has been demonstrated in the lab and given rise to at least equal strengthening level and increasing crack resistance by a factor of 2. This novel strengthening technique enables the use of thinner glass and thus significantly lighter photovoltaic modules. In the thermo-chemical strengthening process, the glass surface composition is modified significantly by increasing the content of aluminum oxide which gives rise to improved properties. The thermo-chemical treatment increases the glass surface contact angle of water, which contributes to a self-cleaning glass. Multifunctional glass surfaces that are both anti-reflective and self-cleaning have been studied by two different approaches, nanostructured surface modification and porous antireflective coatings with photocatalytic degradation ability. Nanostructured glass surfaces give rise to an increased light scattering and can thus effectively guide diffused light to the solar cells and simultaneously change the glass contact angle with water. The LIMES-concept has been demonstrated by quantitative measurements and manufacturing of small silicon photovoltaic modules. The project has significantly increased the potential for commercialization by increasing the TRL (Technology Readiness Level) level from 2-4 to 4-6. There are on-going Investigations on how to scale up flat glass manufacturing towards commercialization.

Project consortium

Coordinator and contact details:

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Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Sweden	2	764'491	694'491
Spain	1	326'880	230'916
United Kingdom	2	840'325	461'616
<i>Total</i>	5	1'931'696	1'387'023

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Swedish Energy Agency	Project N° 38349-1, Lätta Innovativa Material för Effektiva Solcellsmoduler
Ministerio de Economía y Competitividad	PCIN-2013-179, Diseño, fabricación y caracterización de nanoestructuras fotónicas para vidrio solar ultradelgado
Technology Strategy Board	Project N° 620087, Light Innovative Materials for Enhanced Solar Efficiency (LIMES)
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