



Nanosciences, Nanotechnologies, Materials and New Production Technologies Deployment in Latin American Countries

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Nano-niches for sustainable energy

Latin American academic research in nanotechnology for sustainable energy is comparable to the European state of the art, but public-private and international cooperation require improvement. Around 800 publications on nanotechnology for energy have been produced by Latin American authors in 2000-2012. Solar energy was the most frequent topic. National and international investment strategies for sustainable energy should incorporate innovative solutions including nanotechnology.

Decision makers and stakeholders:

researchers in nanotechnology for energy, policy makers in research, energy and environment, industry in energy producing and using sectors, local populations in off-grid regions, environmental groups.

Introduction

Nanotechnology changes the properties of materials and devices at the scale of atoms and molecules (1-100 nanometres, or 10^{-9} m). This offers opportunities for cost reduction of energy technologies by applying cheaper materials. It also offers opportunities for improving efficiencies of these technologies. In Latin America - as in Europe and worldwide - a lot of research focuses on energy applications of nanotechnology, that could contribute to evolutionary improvements of solar energy, fossil fuels, energy storage and transport. The main bottlenecks are the gap between academia and industry and the low visibility of Latin American researchers in international cooperation. European and international networks are keen to work with Latin American partners. One reason is the emerging market for innovative solutions for electricity supply and off-grid energy demand in the continent.

Some proposed solutions

Several suggestions were made for improving international networking and technology transfer from academia to industry. The most concrete proposal was the establishment of the international BALEWARE platform (Bridging Africa, Latin America and Europe on Water and Renewable Energies Applications). This should foster solution oriented networking among researchers and other stakeholders across the three continents, and be launched during a conference to be held end of 2016 in Africa: www.baleware.org. Other suggestions included embedding nanotechnology in national investment plans for solar energy production in Brazil and Chile, and targeting niche markets for solar powered mobile devices in remote regions. Exploiting local mineral and biological resources such as Flor de Ceibo, Uruguay's national flower could help raise public awareness of the technological opportunities.

Organising the intervention - Short term (2020)

European research groups and companies may invite Latin American partners to their networks and research projects funded under the H2020 programme. The European Commission could also target international cooperation in NMP for energy with Latin America and Africa in future calls.



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In 2014, Brazil announced plans for investing in solar PV for energy production, including 10 GW in the coming five years. Research and new technology development is included. This will open opportunities for European research organizations and industry in cooperation with Brazilian partners. Chile is investing in a solar energy industry supplying energy needs in the north of the country. The European Commission recently published a strategic energy technology roadmap. The message is not to optimize individual technologies, but look at the interactions. Nanotechnology and nanomaterials are included as key enabling technologies. Key Performance Indicators (KPI's) should be developed, such as the level of investment in R&I, as well as specific KPI's to measure progress on the performance and cost-reduction for the priorities.

Medium - long term (2020-2030)

Within fifteen years the Strategic Research Agenda (SRA) of the EU Photovoltaic Technology Platform aims at considerable cost reduction for solar energy equipment. Several nanomaterials are included as options in the SRA. One of these options is thin film technologies, where processes and equipment for low-cost, large-area plasma deposition of micro / nanocrystalline silicon solar cells are envisaged.

Organic PV requires further fundamental research and understanding of the physics of the dyes including the effect of nanomorphology and order on charge transport within the cell.

Novel PV technologies may be developed if new methods for nanoparticle synthesis become available (EU PV Platform, 2011: A Strategic Research Agenda for Photovoltaic Solar Energy Technology, 2nd Edition, European Commission).

By then, the United Nations Sustainable Development Goals set three targets relevant to energy:

“7.2 Increase substantially the share of renewable energy in the global energy mix”. SDSN proposes two indicators: Implicit incentives for low-carbon energy in the electricity sector (measured as US\$/MWh or US\$ per ton avoided CO₂). Share of energy from renewables.

“7.3 Double the global rate of improvement in energy efficiency”. SDSN proposes the following indicators: Official development assistance and net private grants as percent of GNI; Domestic revenues allocated to sustainable development as percent of GNI, by sector; Private net flows for sustainable development at market rates as share of high-income country GNI, by sector; Fossil fuel subsidies (\$ or %GNI).

“7.a Enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies”. SDSN proposes the following indicators: Personnel in R&D (per million inhabitants); Gross domestic expenditure on R&D as share of GDP; An indicator on technology sharing and diffusion - to be developed.

Conclusion

The abundant research on nanotechnology for energy applications in Latin America and worldwide represents a lot of unexploited potential for pressing global needs. Bringing together all decision makers and stakeholders to discuss viable routes for bringing nano-solutions to local niche markets is the first step to unlock it.

Further reading

This fact sheet is based on literature and experts participation in interviews and events reviewed in the NMP-DeLA final and energy roadmaps.

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