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Set up of a R&D pilot line for solar PV industry

press release

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Air Liquide Electronics

With over 3,000 employees and **€1,177 million** revenue in 2010, Air Liquide Electronics has activities in ultra-pure and specialty gases, new molecules, related equipment, and customized services.

The Electronics division management is based in Asia to enhance its proximity to the semiconductor, TFT-LCD and PV markets.

The SilexiumTM technology

The technology combines the use of proprietary precursor molecules, together with an innovative gas generation system, to deposit anti-reflective and backside passivation coatings on crystalline silicon solar cells.

The Silexium technology has been qualified by leading industry PECVD (Plasma Enhanced Chemical Vapor Deposition) tool manufacturers.

These films allow the replacement of existing Silane-based anti-reflective coatings while delivering increased cell & module performances.

Air Liquide's early involvement in supplying the solar photovoltaic industry has helped the company establish **leadership** in the photovoltaic market, supplying gases, equipment and services to **8 of the top 10 leaders and more than 150 customers worldwide**. Today, Air Liquide takes another step forward, **investing in a photovoltaic cell manufacturing line for R&D purposes**.

This investment, which consists of a **crystalline solar cell manufacturing and characterization line**, will allow Air Liquide to fully develop and assess new ideas and concepts designed to improve the performance and reduce the manufacturing costs of crystalline solar cells, and thereby helping to bring solar energy closer to grid parity.

Crystalline silicon remains the dominant technology among the various photovoltaic cell technologies, representing **85% of worldwide production** in terms of power output. Even though it is the most mature technology, crystalline silicon-based solar panels have recently made outstanding progress in **energy conversion efficiency**, and show strong potential for further improvement.

Air Liquide recently acquired the SilexiumTM coating technology and associated IP from Sixtron, a Canadian company. The objective is to further develop this technology, leveraging the relationship Air Liquide has already established with its customers through joint development programs. The new pilot line will allow Air Liquide to **fully demonstrate and optimize new materials and processes** adapted to each customer's needs. The pilot line will be located in **Air Liquide's Corporate R&D center near Saclay**, west of Paris, France, and will be run by a pool of scientists experienced in PV technologies.

Francisco Martins, Vice-President World Business Line Electronics of the Air Liquide Group, declared: ***"The acquisition of the SilexiumTM technology and the investment in an R&D pilot line demonstrate Air Liquide's commitment to the continued development of new supply solutions for the PV market and its support for the development of clean energies. The photovoltaic business is at the crossroads of Energy and the Environment, and requires High-Tech solutions, three growth drivers for the Air Liquide Group."***

The use of gases in the photovoltaic industry

Gases are used at all stages of the solar cell manufacturing process:

- to produce Poly-Silicium: high-volume of nitrogen (N₂) and hydrogen (H₂)
- to produce Si wafers: large quantities of nitrogen, argon (Ar) and helium (He)
- to produce crystalline-Si cells: carrier gas (N₂) and specialty gases such as silane (SiH₄), ammonia (NH₃), doping gases/chemicals (POCl₃), passivation and coating precursor materials
- to produce Si Thin Film cells: carrier gases (N₂, H₂), specialty gases (SiH₄, NF₃/F₂, dopant mixtures), inter-layer and coating precursor materials.

Air Liquide is the world leader in gases for industry, health and the environment, and is present in **80 countries** with **43,600 employees**. Oxygen, nitrogen, hydrogen and rare gases have been at the core of Air Liquide's activities since its creation in 1902. Using these molecules, Air Liquide continuously reinvents its business, anticipating the needs of current and future markets. The Group innovates to enable progress, to achieve dynamic growth and a consistent performance.

Innovative technologies that curb polluting emissions, lower industry's energy use, recover and reuse natural resources or develop the energies of tomorrow, such as hydrogen, biofuels or photovoltaic energy... Oxygen for hospitals, homecare, fighting nosocomial infections... Air Liquide combines many products and technologies to develop valuable applications and services not only for its customers but also for society.

A partner for the long term, Air Liquide relies on employee commitment, customer trust and shareholder support to pursue its vision of sustainable, competitive growth. The **diversity** of Air Liquide's teams, businesses, markets and geographic presence provides a solid and sustainable base for its development and strengthens its ability to push back its own limits, conquer new territories and build its future.

Air Liquide explores the best that air can offer to preserve life, staying true to its sustainable development approach. In 2010, the Group's revenues amounted to **€13.5 billion**, of which more than 80% were generated outside France. Air Liquide is listed on the Paris Euronext stock exchange (compartment A) and is a member of the CAC 40 and Dow Jones Euro Stoxx 50 indexes.