R&D pilot production line for >20% efficiency silicon solar cells

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During recent years the world-wide production of silicon solar cells has been growing at rates of ~30% per year and continues capturing an 80% market share of the multi-billion Photovoltaic (PV) industry. However the conversion efficiency of single-junction silicon solar cells currently being manufactured rarely exceeds 17% (i.e. only 17% of the incident energy from the sun is converted into electricity), whilst the theoretical maximum efficiency for such a device is around 30%. Reduced efficiencies are the result of the fabrication processes utilized nowadays in high-volume manufacturing to create the cells. The first part of this presentation will describe Silicon solar cell technologies, discussing the need for innovative processing approaches that can achieve >20% efficiencies while allowing scalability to high-volume manufacturing.

The second part of the talk will present the R&D pilot production line for >20% efficiency silicon solar cells that Siliken Renewable Energies is building at the City of innovation of the Polytechnic University of Valencia (Spain). This facility is focused on new Process&Design concepts for high-efficiency solar cells that can be manufactured at low cost. Our mission is to develop a pilot line consisting of custom-designed thin film deposition and wet/dry patterning tools, based on technologies traditionally used in the semiconductor industry and that are currently being demonstrated in high-volume PV manufacturing. The short terms goals are building a portfolio of intellectual property, scientific peer-reviewed publications and presentations at international conferences, while the long term goals involve building of a production line based on technology developed at the pilot line. The pilot line facility offers excellent opportunities of collaboration with research groups focused in applied physics/chemistry, material science and electrical engineering.