A new generation of solar modules

Flexcell manufactures light, thin and flexible PV cells, using a proprietary thin film coating technology developed in the laboratories of the Institute for Micro-Technology ("IMT") at the University of Neuchâtel in Switzerland. With the aim to achieve significantly lower production costs, Flexcell has industrialised the process to deposit a single amorphous silicon layer on low cost plastic substrates.

Thin film solar cells

The high costs of crystalline silicon wafers led the industry to look at cheaper raw materials for the manufacturing of solar cells.
The most common materials used are amorphous silicon or polycrystalline materials like cadmium telluride (CdTe) and copper indium (gallium) diselenide (CIS or CIGS). These materials are all good light absorbers and therefore only need to be about 1 µm thick, hence material costs are significantly reduced. All of these materials are suitable for large area deposition and hence high volume manufacturing. The thin film semi-conductor layer can be deposited either onto coated glass, stainless steel or plastic substrates.

Amorphous silicon is the best developed of the thin film technologies

Although amorphous silicon cells are less efficient (4% to 8% stabilized module efficiency), they are potentially cheaper than crystalline silicon and other thin film technologies, because of their lower material costs and cheaper scalable manufacturing processes. Thin film technologies can offer particular design options for building integrated applications and have the potential to meet the BIPV product requirements.

VHF-coating process

A Very High Frequency Plasma Enhanced Chemical Vapour Deposition Process (VHFPECVD) is used to coat a substrate with nano-scale amorphous silicon layers (0.3 µm). The VHF process has a deposition rate 5 times higher than conventional radio frequency plasma deposition processes, thus resulting in a shorter deposition time. The process temperature is also substantially lower, thus allowing the coating of plastic substrates.

Roll-to-roll manufacturing

The flexibility of the plastic substrate used by Flexcell enables roll-to-roll manufacturing processes, thus allowing high throughput and easy to upscale production capacity.

There are five major steps in our manufacturing process:

1. Metal coating of a plastic roll
2. VHF Plasma Enhanced Chemical Vapor Deposition of a-Si layers
3. Multi-pass plasma Vapor Deposition of Transparent Conductive Oxide (TCO)
4. Layer structuring
5. Module encapsulation with plastic foils