

## **Roll-to-roll manufacturing of high efficiency and low cost flexible CIGS solar modules**

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A European research and industry consortium is working together in the FP7 project “R2R-CIGS” with as aim the development of cost-effective roll-to-roll (R2R) processes and technologies for the continuous, high-volume manufacturing of flexible photo-voltaic (PV) modules. As absorber material the high-efficiency thin film copper indium gallium (di)selenide (CIGS) material is used. An important target for meeting this aim is to achieve 20% cell efficiency and to develop 16% module efficiency on flexible polymer substrates.

Processes and tools are developed for modifying and controlling the structural, chemical, and electrical characteristics on nano-scale of the CIGS absorber, buffer layer, front electrode and encapsulation. Addressed are the scaling-up of deposition of nano-scale composition graded CIGS layers for R2R manufacturing, in-line compatible cadmium free buffer layer deposition processes, automatic laser scribing for monolithic interconnection and moisture barrier coated encapsulation for long term performance stability. The processes will be implemented on R2R systems in two pilot lines, one with an all-in-one-vacuum, the other with a modular set up.