Laser Patterning of smart Nanomaterials for Reel-to-Reel production of Organic Photovoltaic (OPV) Devices

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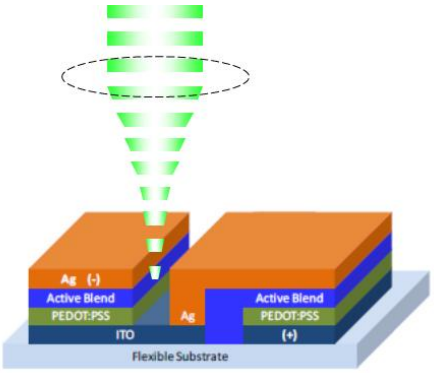
EU funded project Smartonics main objective is to develop pilot production lines to combine smart processing technologies with new nanomaterials for the precision synthesis of Organic Electronic (OE) devices. For example, organic photovoltaic (OPV) devices are attracting increasing commercial interest due to their potential low manufacture costs; low weight/size, flexibility and partial transparency, which allows them to be used on the exterior windows of cars & buildings. The direct write and non-contact nature of laser patterning is highly desirable for integration with reel-to-reel production lines to form the P1, P2 & P3 serial interconnection and isolation structures necessary for thin film solar cells. However, detrimental effects such as layer edge delamination or laser debris redeposition can effect OPV performance and represent real technological problems hindering the adoption of laser schemes to production lines. Since, OPVs consist of highly sensitive, thin (<0.2 µm) layers of novel organic & inorganic materials, the reduced thermal effects of sub-nanosecond and other ultrafast lasers along with intelligent beam delivery schemes are key to produce selective removal of individual thin film layers. P1, P2 & P3 scribes made using these lasers are characterized to identify the laser parameters and conditions required to produce working solar cells.

(a) 

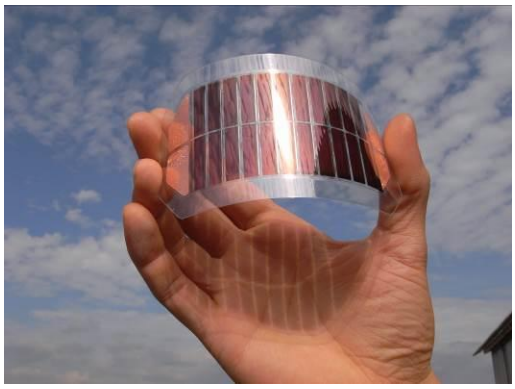
(b) 

Figure 1 (a) Schematic of laser ablation of the P3 isolation scribe to form (b) flexible OPV ~~modul~~module.