

THREE DIMENSIONAL SOLAR MODULES

enhanced energy generation

Introduction

Solar energy accounts for 1/3 of world's energy demand today, with most of the solar installations in Asia region. All installations are using one or the other below solar technologies.

- Crystalline Silicon modules (efficiency @ 16 ~ 18%)
- CdTe thin film modules (efficiency @ 11 ~ 13%) •

CIGS thin film modules (efficiency @ 16 ~ 18%)

Module efficiencies usually dominate the energy production per square meter area as it completely depends on the sunlight absorption. Above outlined modules are accepted for large solar farms generating multiple mega watt energy. Space is not a factor for such large MW scale plants. However, modules with such efficiencies are considered in--adequate to power transportation systems such as busses, trains, cars, trucks etc., which have limited roof space availability.

Technology

T3DP, a start--up company in the USA along with a Singapore partner and collaborator company **Microchip Lab Pte Ltd.**, has since been working on enhancing the solar module efficiencies by a next generation solar technologies such as 3 -- Dimensional / 4 -- Dimensional solar cells & modules combined with new and low cost thin film / compound technologies.

A preliminary feasibility study using currently produced CdTe thin film module (Fig.1 & Fig.2) in our 3D technology has resulted in 80% jump in the efficiency from 11% to 19.8%.

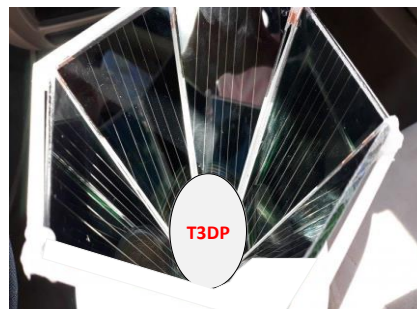


Figure 1: CdTe triangle module samples assembled in produced for feasibility study at Hexagonal trapezoid format and Microchip Lab Pte Ltd, Singapore

Fig 2. CdTe modules 3D tested for efficiency

We believe in further increasing the efficiencies to 25% -- 30% with newly designed thin film process technologies & thin film chemistries and assembling the modules in 3 -- Dimensional array as represented at Fig 3. Below

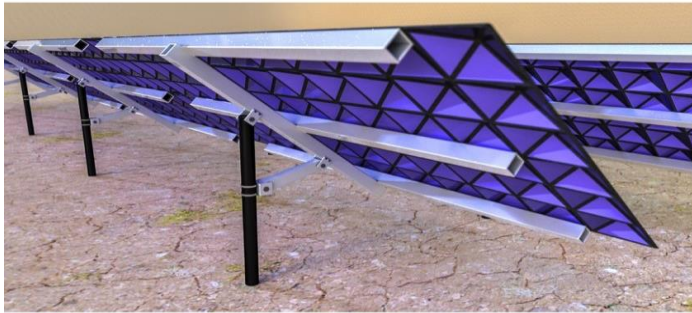
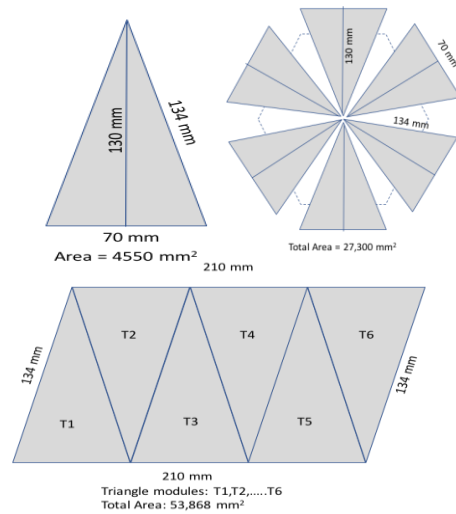


Fig 3: 3D array solar module installation at future solar farms



Triangular)/3D)solar)panels)vs)flat)rectangular)solar)panels:)

Calculations)&)Data:

Triangular)Solar)panels:

! Dimensions)/)Area)for)each)triangular)solar)module

! Dimensions)/)Area)for)each)six)(hexa))solar)module)

Flat)/)Rectangular)Solar)panels:

Dimensions)/)Area)for)each)six)flat)solar)module) **Light)exposure)Test)Results:**

Rectangular)flat)panel)area)=)53,868)mm²

Measured)flat)module)efficiency)=)11%

Triangle)3D)module)area)=)27,300)mm² Measured)3D)module)efficiency)=)19.8%