

## The Great Debate – Mono vs Poly

A lot of people say 'What is the difference between mono and poly? I heard mono is better than poly.'

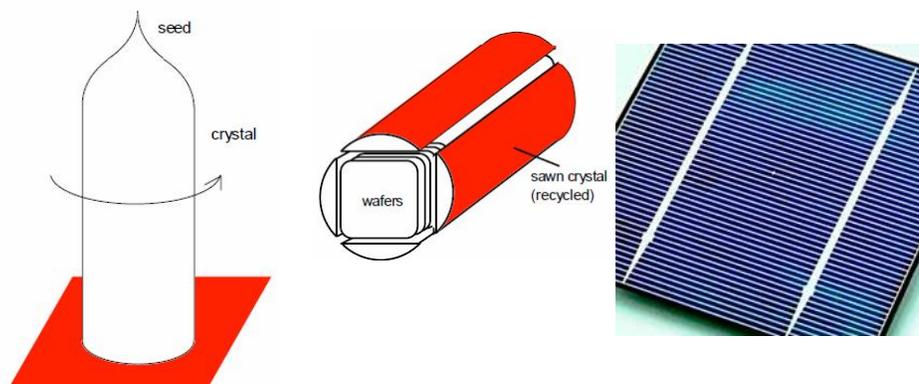
The answers to these questions are 'not much' and 'no'.

### **How the wafers are made**

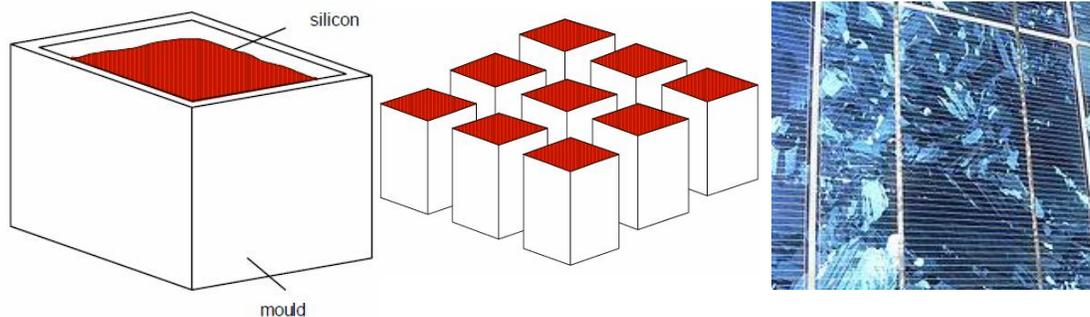
Mono cells are made by growing a cylindrical ingot of crystal silicon from a small seed crystal. The ingot is one crystal, hence the name 'mono-crystalline' or single-crystal. This ingot is then trimmed into a square and sliced into wafers.

While poly cells are made by pouring molten silicon into a square mold and allowing it to set. Since the silicon cools at different rates (the outside sets faster than the inside) and there is no seed crystal to 'grow' the new material from the resulting block contains many crystals. This gives the name 'poly- or multi-crystalline' and gives the resulting cells their multifaceted sparkly appearance.

### Mono Process



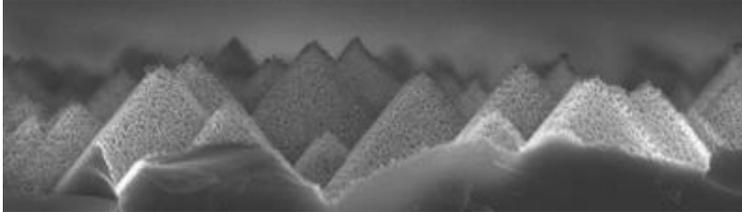
### Poly Process



**So the question again – ‘which is better?’**  
**How about a question for a question – how do we define “better”?**

Is ‘better’ actually ‘more efficient’? The answer here is ‘yes’.

Poly cells have internal losses associated with the boundary lines where the different crystal facets meet. Mono cells, being only one crystal, do not have these internal losses. Mono cells have another advantage as well. The specific orientation of the mono crystal allows the creation of surface pyramids. These pyramids help to absorb more light into the module.



Different manufacturers also use many other processing techniques to improve their efficiency. Always check your module data to see what else is done to optimize the cell efficiency.

Suntech cell efficiency chart (v0809)

Cell efficiency	180W-Ad	200W-Ub
Mono	17.5 %	16.1 %
Poly	16.0 %	15.2 %

Does ‘more efficient’ mean ‘more power’? The answer here is ‘yes, for the same area’.

A mono module rated at 180W with an area of 1.28m<sup>2</sup> may be 14.1% efficient while a poly 200W module with an area of 1.47m<sup>2</sup> may be 13.6% efficient. So efficiency is only a measure of module output based on module area – the higher the efficiency the more power will be produced from the same size module. Or to look at it the other way, the same output with less modules. This could be very important where available roof space is an issue.

Does ‘more efficient’ mean ‘more energy in the real world’? The answer here is ‘no’. So the next question is ‘why not and how do we know which gives more energy in the real world’?

Energy is Wh (or kWh), not just W (or kW) so we also need to consider weather factors such as the strength of the sunlight, the amount of cloud cover and the ambient temperature. To show this more easily many module manufacturers will give either a ‘temperature characteristics’ rating or a NOCT rating (Nominal Operating Cell Temperature). These ratings give an indication of how the modules will perform ‘on the roof’ rather than ‘in the lab’.

SUNTECH POWER NOCT chart (v0809)

Model	180W-Ad	200W-Ub
Pmax temp coefficient	-0.48%/°C	-0.47%/°C
Pmax @ NOCT	131W	146W

Since the temperature characteristics of the mono and poly modules are almost identical they will both perform in the same manner in the ‘real world’.

**So the first question (‘what is the difference between mono and poly?’) has been answered. And the second question (‘I heard mono is better than poly’) is really just an urban legend!**