Invisible metal contacts for solar cells

ETC Solar, Inc is developing world's highest performance front-contact technology for solar cells: Effectively Transparent Contacts (ETCs).

Background information
Metal contacts and transparent conductive oxides (TCOs) are used for charge extraction in solar cells. Conventional metal contacts typically cover ~5% of the solar cell front surface, blocking sunlight from reaching the photovoltaic material below (figure 1a). Front contacts contribute 4-5% to the electrical current losses – this is the largest single contribution to performance loss in solar cells. Great effort has been devoted to overcoming metal grid shading losses by using TCOs. However, TCOs provide low loss lateral charge transport only over small areas and short distances, and also, exhibit parasitic absorption, which leads to significant loss in electrical current density of 4% (figure 1b).

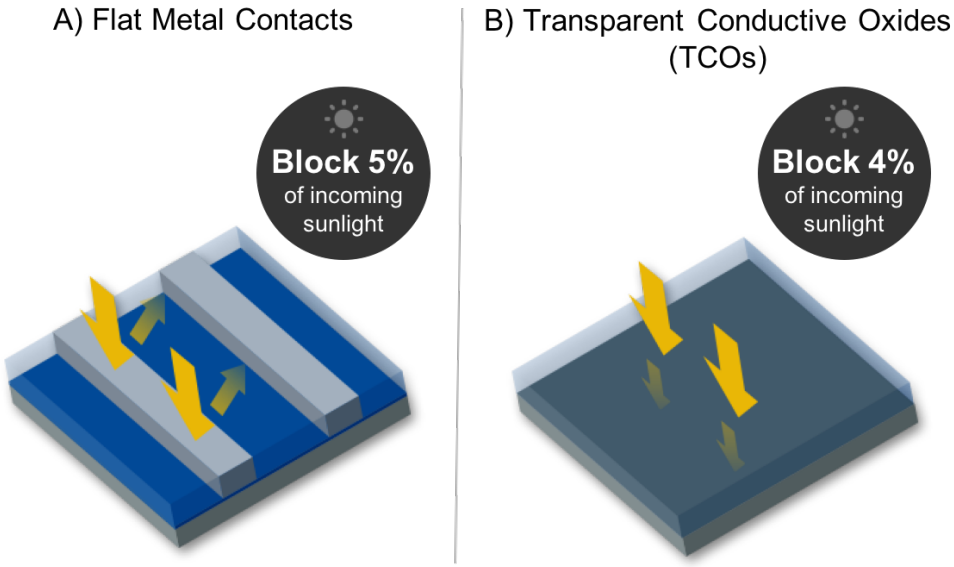

Figure 1: a) flat metal contacts block ~5% of the incoming sunlight, b) TCOs provide poor lateral charge transport and exhibit ~4% parasitic absorption.

ETC Solar, Inc is commercializing world's highest performing front contact technology for solar cells: effectively transparent contacts (ETCs). ETCs are the first industrially viable approach to completely eliminate front-contact optical losses of flat metal contacts and significantly reduce parasitic absorption in TCO layers.

ETCs are triangular shaped, micro-scale, high aspect ratio metal contacts (Fig 2). When sunlight impinges on the ETCs it is efficiently redirected to the active area of the solar cell. The ETCs exhibit 99.9% optical transparency while providing excellent conductivity. Thereby, the ETCs provide a superior solution to flat metal contacts and TCOs for charge extraction from solar cells. ETCs are compatible with III-V, thin-film, silicon solar cells, and even with

emerging technologies such as perovskites and organic photovoltaics – which makes ETCs a powerful generic solution to address front-contact optical losses.

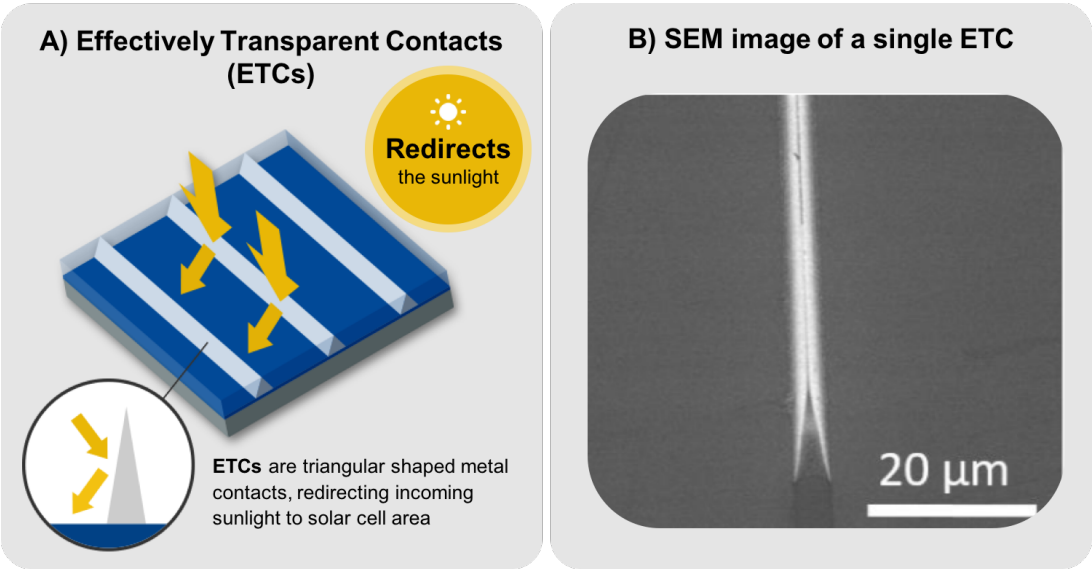

Figure 2: A) Schematic of ETCs integrated on top of a solar cell providing power output boost by redirecting the incoming sunlight, B) scanning electron microscope (SEM) image of a single ETC.

Assistance request:
Below an overview is given of the main technical request, which will be critical for ETC Solar during the next phase. Please feel free to reach out to us if you're interest in joining our mission or would like to receive more information!

- New talent will be attracted to help scale the ETC technology towards its sellable product and revenue. Key hires included:
  - i) microfluidics expert,
  - ii) polymer expert
  - iii) silver nanoparticle ink expert
  - iv) chief financial officer (CFO)
- Help with the characterization of silver nanoparticle inks and assistance with the re-formulation of the inks to optimize the ink for our application.
- Polymer testing (degradation, re-usability) and formulation of new polymer compositions for optimized durability usage.
- Expertise in lamination processes:
  - Silicon heterojunction solar cells
  - Thin-film technologies
  - III-V solar cells

Contact:
Webpage: www.etc-solar.com
Email: thomas@etc-solar.com