Heliotrope Technical Assistance Request

Heliotrope Project Description:

Heliotrope light-shifting technology improves the performance of silicon solar panels by 8 to 15%. By converting wasted ultraviolet light into usable infrared light, our coatings transform the sunlight to improve the panel efficiency without changing the underlying cells. Our low-cost solution is designed for easy integration into current silicon solar manufacturing. By applying the coatings on solar glasses, solar manufacturers can upgrade their solar panels while leveraging the existing facilities and reducing production costs. Increased panel performance also lowers electricity costs for consumers, making solar energy more competitive against other traditional fossil fuels sources.

Currently, we have achieved a 1:1 coating, which converts one ultraviolet photon to one infrared photon (Fig. 1). Based on optics modeling, this coating can deliver a 8% power boost for silicon solar panels. We are seeking technical help to build a prototype cell with this 1:1 coating, and to advance this coating further to a 1:2 coating, which can increase the panel performance by 15%. Fundings, vouchers, and technical assistance from the American-Made Solar Prize can provide valuable resources to help our technology cross the pre-commercial gap with strong relevance to the industry. We list our critical development areas in the next section that we can hope to fund through Prize awards and vouchers.

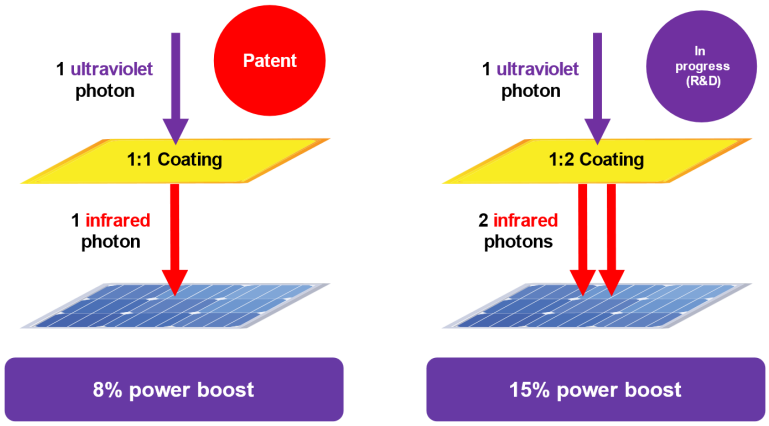

Figure 1. Heliotrope light-shifting technology can boost the efficiency of solar panels by 8 to 15%.

Heliotrope Key Needs:

Priority 1: Fabrication & Prototyping

We need help with building a prototype silicon solar cell integrated with Heliotrope coatings. We plan to test our coatings on different types of silicon solar cells (HJT, PERC and IBC) with the maximum size of 15 cm x 15 cm. We need access to a solar laminator that matches industrial standards to laminate those solar cells. We plan to test out the lamination experiment with multiple encapsulant materials to test adhesion and optical coupling. We also need help with characterizing the prototype. We want

to test the performance of the prototype cell by measuring its IV curve and EQE under a solar simulator AMG 1.5.

In addition to lab access, we welcome all technical support from experts with backgrounds in solar design and optics to help us troubleshoot engineering issues.

Priority 2: Science, Research & Development

We want to advance our 1:1 coating towards the 1:2 coating, which will require access to a physical vapor deposition (or vacuum thermal) system and a photoluminescence (PL) system. We are looking for a PL system that has mapping capabilities and can measure time-resolved PL in the near-infrared region. For the deposition system, we prefer a small-scale system with multiple thermal and sputtering sources and good control over evaporation rates. We welcome all technical support for experiment design and data analysis.

Priority 3: Business Development & Commercialization

The ideal support team helps us identify potential partners which have expertise in large-scale deposition and solar field testing. Additionally, a team with a strong network within the solar industry would be helpful in connecting us with future customers. We also need assistance with refining our business model, developing sales strategies, and planning budgets to forecast our expenses for future fundraising,