U.S. DEPARTMENT OF ENERGY

American-Made Solar Prize Round 7 Ready! Technical Assistance Request

Active Surfaces

Active Surfaces is developing flexible, perovskite and organic based thin-film solar modules. The development of a flexible, low cost, efficient and stable solar module that meets industry and market requirements will take concentrated efforts from multiple players. Solar energy generation is a broadly regulated market and customers require a high level of external validation due to the financial forces involved with establishing new assets. A new type of flexible panel that hits these various metrics will require the cooperation of both public and private players. Among these players are members of the National Labs, Government Agencies and private industry.

External Validation

A number of standard reliability tests are necessary to pass for new technologies entering the market, IEC 61215:2021 “Terrestrial photovoltaic (PV) modules”; IEC 61701:2020 “Salt mist corrosion testing”; IEC 62804; “Test methods for the detection of potential-induced degradation”; UL 1703 “Standard for Flat-Plate Photovoltaic Modules and Panels”; AS/NZS 1170.2:2021 “Wind Actions”; UL 7103 “Outline of Investigation for Building-Integrated Photovoltaic Roof Coverings”; UL 61730 “Standard for Photovoltaic (PV) Module Safety Qualification”; UL 580 “Standard for Tests for Uplift Resistance of Roof Assemblies”.

It would be impossible for new technologies entering the market to succeed without assistance from public testing and validation centers. Among these test centers are the national lab’s like NREL which is widely regarded as the most trusted authority on module level certifications. Sandia National Labs excels with outdoor validation testing and and larger scale stress testing and is the leader on testing up and coming Building Integrated PV systems.

Partnerships with the National Labs and many other federally funded labs can significantly lower the barrier to entry of new and upcoming technologies like those being developed by Active Surfaces and the industry as a whole. **Partnerships to support third-party validation at NREL, Sandia and other federally funded programs like the AFFOA, NEXTFLEX can significantly reduce the barriers to entry of new technologies the meet market demands.**

Equipment, Know-How and IP

The standards listed in the previous section provide a barrier to entry for new technologies but also present an economic barrier to entry for development. Many of the tools and testing equipment are out of reach for early stage companies. Similarly, the pilot manufacturing and upscaling equipment required to even hit commercially relevant sizes presents additional barriers. **Partnerships with NREL, Sandia and other federally funded programs would allow access to early piloting equipment at NREL’s Advanced Manufacturing Research**

Center and Sandia's Materials and Advanced Manufacturing. Developing novel technologies on these toolsets would rapidly speed up development on tools that matter for domestic manufacturing and growth.

Similarly, the National Labs house some of the world's best scientists in optoelectronics and photovoltaic science. The institutional knowledge built over decades would help early stage startups like Active Surfaces to avoid common pitfalls to efficiently utilize capital for scale. **Similarly, a collaborative relationship between Active Surfaces and the National Labs would allows for cyclic information flow that supports additional research and development into perovskites and thin-film flexible solar as well as supports a growing domestic manufacturing industry.**

Lastly, at the height of perovskite and organic photovoltaic research, over 15,000 research papers were published yearly. Many of those works were patent protected. Many patent families also exist in the DOE and DoD network. There is simultaneously enough IP floating in both private and public circles in order to develop new flexible solar modules but not enough IP owned by any one party to accommodate such development. **A public private partnership between various DOE and DoD agencies, the National Labs and the broader network of federally funded labs would allow for collaboration and sharing of IP to support the growth of next generation photovoltaics.**

Regulation and Sustainability

Perovskite based electronics utilize components that are regulated by various U.S. agencies like the U.S EPA and U.S. OSHA. Therefore, the scaling of these technologies requires the EPA and OSHA to be intimately involved in order to proper development and scaling to occur while maintaining proper worker and environmental health. Active Surfaces foresees the need to get technical assistance with the U.S. EPA to develop robust testing methods to ensure that perovskite technologies meet RCRA, CAA and TSCA standards. **Active Surfaces requests assistance with the broader EPA Laboratory Enterprise in order to third party validate that our technologies can meet these regulatory standards.**

Similarly, life cycle analysis is critical to the development of new energy technologies. Although our own estimations indicate that perovskites will ultimately be safer to process and be easier to recycle while having less embodied carbon than existing technologies, **the National Labs and other federally funded labs can provide guidance and assist with fill life cycle analysis for additional assurance as this industry grows.**

New Job and Knowledge Creation

Given the technical capabilities required for the research and development of perovskites based solar modules, talent resources are scarce. As Active Surfaces expands, we expect job creation in the product development team and would benefit from the network of the National Labs to identify and recruit relevant talents. **A partnership with the National Labs would allow for access to talents who have specific expertise in the field and allow for scientific collaboration and joint-knowledge creation benefiting both National Labs and Active Surfaces.**