

Performance Targets for Perovskite Photovoltaic Research, Development, and Demonstration Programs

DATE: October 15, 2021

SUBJECT: Request for Information (RFI)

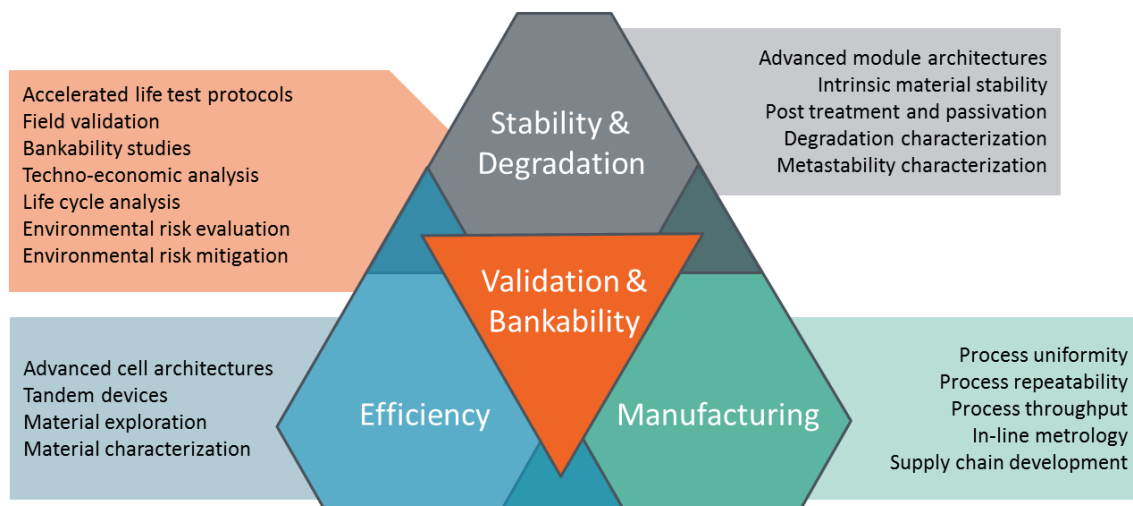
Description

The U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Solar Energy Technologies Office (SETO) is requesting information on efficiency, stability and replicability performance targets for perovskite photovoltaic devices that could be utilized to demonstrate technical and commercial readiness for future funding programs.

Background

Perovskite photovoltaic technologies show the potential for high-efficiency operation and low production costs. As such, they may significantly contribute to achieving SETO's goals for low-cost domestic solar electricity. The research and development community has demonstrated high-performance devices at small scale, as well as the applicability of high-throughput manufacturing approaches, such as roll-to-roll fabrication. For commercial success, perovskite technologies must simultaneously achieve high performance, high stability, low cost, and verifiable performance.

The SETO funding programs for perovskite technologies have been structured around addressing these four major challenge areas:



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As the community has successfully advanced along these fronts, SETO programs have supported transition to larger-area devices and highly scalable fabrication approaches, high-performance tandems, demonstrations of field stability, fabrication replicability, and similar RD&D topics. A diversity of approaches, technical targets, and areas of focus remain active in the field.

As perovskite technologies mature and industry develops, establishing common, objective targets will assist in aligning community efforts, ensuring relevance of potential future funding programs, and accelerating technical and commercial development and de-risking of perovskite technologies.

SETO has developed the following proposed target matrix for perovskite photovoltaics, which are intended to align with SETO goals and mission areas. SETO believes the ability to meet these targets for single-junction, perovskite-only tandems, or hybrid tandems would provide strong evidence that the technology is ready to enter an initial production stage.

Proposed SETO Targets for Perovskite Photovoltaics:

Configuration	Total Area PCE ¹	Total Module Area	Stability	Sample Population Requirements
Single Junction	18% PCE	>=900cm ²	Pass IEC 61215 MQT 10, 11, 12, 13, and 21 with <10% relative performance loss per test ² 6 months continuous outdoor testing with <2% relative degradation	>1kW total, at least 20 modules for outdoor testing ³
PVSK-only Tandems	25% PCE			
Hybrid Tandems	27% PCE			

1. Measured after at least 10kWh/m² outdoor exposure
2. Validation Center (or other independent laboratory) will assign devices to each MQT from available sample population. Standard sampling protocols may not be followed due to available sample population sizes. Test overview:
 - a. MQT 10 – UV preconditioning test: 15kWh/m², 60°C
 - b. MQT 11 – Thermal cycling test: 50 cycles, –40°C to +85°C
 - c. MQT 12 – Humidity freeze test: 10 cycles from +85°C, 85% RH to –40°C
 - d. MQT 13 – Damp heat test: 1000 h at +85°C, 85% RH
 - e. MQT 21 – Potential induced degradation test: IEC TS 62804-1 +85°C, 85% RH at maximum system voltage for 96 hours
3. Devices will be assigned to accelerated or outdoor testing by the Validation Center or other independent laboratory (not by the fabricator)

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Purpose

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders on issues related to the proposed perovskite performance targets as listed above. This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

Disclaimer and Important Notes

This RFI is not a Funding Opportunity Announcement (FOA); therefore, EERE is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

Confidential Business Information

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Evaluation and Administration by Federal and Non-Federal Personnel

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine,

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nondiscretionary administrative activities. The respondents, by submitting their response, consent to EERE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

Request for Information Categories and Questions

1. Do you feel all the proposed targets are relevant and necessary to proving technology performance of perovskite photovoltaic devices? If not, please specify why not.
2. What changes or additions, if any, would you make to the proposed performance targets to improve their relevance and usability?
3. Are there any specific tests, protocols, or targets that would be difficult for your organization to evaluate, require additional equipment, or place a large burden on your organization?
4. DOE is considering using these targets to evaluate applicant readiness for manufacturing RD&D programs – when do you anticipate your organization would be able to meet the targets as written?

Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to seto.pvsk.rfi@ee.doe.gov no later than 5:00pm (ET) on November 12, 2021. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 3 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable. Respondents may answer as many or as few questions as they wish.

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

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- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.

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