PMC-EF2a
(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: Solexant Corp **STATE:** CA

PROJECT TITLE : Sintered CZTS Nanoparticle Solar Cells on Metal Foil; NREL Tracking No. 11-017

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
		NREL-11-017	GO10337

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:
Description:

B3.6 Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible).

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

A11 Technical advice and planning assistance to international, national, state, and local organizations.

Rational for determination:

The The Photovoltaic (PV) Technology Incubator project represents a significant component of the U.S. Department of Energy (DOE) business strategy of partnering with U.S. industry to accelerate the commercialization of photovoltaic system research and development (R&D) to meet aggressive cost and installed capacity goals. This specific partnership leverages technical capabilities and resources within the National Renewable Energy Lab (NREL) and other DOE laboratories/facilities to enhance and support areas of expertise within a small business in order to accelerate the development of the small business's technology. This early-stage assistance in crossing the technological barriers to commercialization also provides a better level of understanding and development on which the investment community can base decisions. Additionally, it will have multiple benefits for the country including reaching cost parity with baseload energy rates, increasing solar PV market share, boosting domestic solar manufacturing, and reducing greenhouse gas emissions.

The subcontractor (Solexant Corp) for this proposed 12-month PV Technology Incubator program would develop a new thin film material from substances that are non-toxic and not rare, with the goal of improving their efficiency. These sintered thin film copper-zinc-tin-selenium (CZTS) solar cells would be constructed with a nanoparticle (NP) ink that could be printed and shall result in commercially viable thin film solar cell efficiencies using scalable, low cost processes. One significant point of this R&D effort is that CZTS is a solar cell material made entirely from earth-abundant materials lacking hazardous elements such as cadmium or lead. This work would be done in three tasks, as shown below.

• Task 1 – goal would be to provide efficiency improvements
- CZTS Nanoparticle (NP) Ink Development
- Se Analog of CZTS NPs and Mixed S/Se NPs
- CZTS/Se Thin Film formulation
- It is expected that the R&D in these subtasks would result in a total-area efficient CZTS solar cell ranging from 7% to 10% from month 3 to month 9.

• Task 2 – goal would be to characterize device efficiency limitations and reliability, to identify areas for further improvement
- Determine causes for performance limitations
- Optimize devices to increase efficiency
- It is expected that the R&D in this task would result in an aperture-area efficiency of 10% (100mm x 100mm) minimodule at the end of 12 months.

• Task 3 – goal would be to develop wide area nanoparticle printing of CZTS ink, large area cell solar fabrication and

integration of CZTS devices, and encapsulation of these integrated minimodules
- Scale up NP ink to liter scale
- Demonstrate side-web (750 mm) printing
- Produce 10 m of continuous CZTS coated web
- Fabricate fived small area functional CZTS solar cells (0.25 cm^2) by month 12

All activities would be done using existing equipment, employees, and facilities in an existing research and development laboratory located in an industrial office park at 2385 and 2387 Bering Drive in San Jose, California 95131 (see map and aerial photo uploaded to this database in file name: NREL Environmental Checklist – addl info.doc.). Solexant occupies two adjacent buildings one of which is for its pilot line and the other is for R&D use. This latter building is where the PV Incubator work would be performed. Work would be completed using industry standard methods and protocols, and in accordance with all federal, state, and local regulations. Work is expected to occur between Q1 2011 and Q1 2012. These labs (approx 8000 SQFT) are equipped with Solexant-owned process and characterization equipment appropriate for solar cell development. Solexant Corp. laboratories follow OSHA standards as well as its corporate safety policies, and these standards and policies would continue to be followed for the proposed project. Solexant has mandatory safety training for all employees, as well as monthly safety inspections performed by employees on a rotating basis and reviewed by the entire group at monthly safety meetings. All employees are also trained in chemical safety and handling. Safe handling of chemical and hazardous materials is carried out in chemical fume hoods at bench scale and all work would be carried out indoors. The laboratory is equipped with fume hoods for chemical handling, vented solvent and waste flammable cabinets, fire extinguishers, eyewash stations, and spill kits.

Solexant holds applicable all permits necessary for this proposed project. They are a Large Quantity Generator (LQG) of hazardous waste with the assigned EPA identification number of CAR000189563. They file California Hazardous Material Business Plans (HMBP) and hazardous waste disposal reports with their local Certified Unified Program Agency (CUPA), County of Santa Clara Hazardous Materials Compliance Division. They also have the appropriate fire code, flammable material, etc. permits with City of San Jose. No air quality permits or industrial wastewater discharge permits are required. This project would not require any modifications to existing permits and registrations, or acquisition of new permits. This proposed project would result minimal increases of hazardous waste generation, hazardous material utilization, and de minimis air emissions. All hazardous waste would be properly handled onsite and disposed of at offsite permitted facility via a licensed hazardous waste transporter.

Based on the information above, this proposed action would qualify for Categorical Exclusions A9, A11, and B3.6.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

Note to Specialist :

EF2a created by Rob Smith on 05/06/2011

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Lori Plummer / Lori Plummer Date: 5/11/2011
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.