U.S. Department of Energy
Categorical Exclusion Determination Form

Program or Field Office:	Office of Energy Efficiency and Renewable Energy: Phase III Xlerator Program
Funding Opportunity Number	DE-FOA-0000397
Applicant Name:	Applied Nanotech
Location:	Austin, TX
Project Title	High Capacity Manufacturing of Non-Contact, Printable Metallic Inks for Silicon Solar Cells

Proposed Action or Project Description — American Recovery and Reinvestment Act: ☑

Electrical contacts are a critical part of photovoltaic technology and in particular represent a difficult and costly area for silicon solar cell production. In particular, it would be desirable to non-contact printing processes which would be much more cost effective, environmentally benign and materials efficient compared with existing manufacturing methods. Although such printing methods have proved successful for silver and for nickel/copper top contacts, silver is too expensive and the use of a nickel diffusion barrier for Cu plating adds cost and complexity to the assembly process. Alternative metals such as aluminum and copper have thus far been unsuccessful because of their inherent chemistries. ANI has successfully developed a solar grade aluminum ink that can be deposited using non-contact techniques and which provides several key advantages compared with screen-print materials. The proposed research will exploit recent advances in nanotechnology to lower production costs for silicon solar cells by developing conductive inks that can be applied using non-contact printing techniques. The funded effort will enable a 1.6 Metric ton/year ink manufacturing facility capable of supporting 2MW of silicon solar cell production within the first year. The overall goal of this Phase III program is to design a pilot production plant capable of producing conductive inks that can be applied through non-contact print techniques. If successful, the technology developed through this SBIR program and put into production during this requested Phase III program will provide an accurate, robust, reliable and cost-effective method for increasing electrical energy efficiency in silicon solar cell production and usage. These unique ink based processes for next generation high efficiency devices represent a critical step which could dramatically change the paradigm for this technology, enabling the formation of these critical contacts using methods previously unavailable to the photovoltaic industry. The implementation of non-contact printing techniques can decrease the cost to manufacture by enabling the reduction of the silicon wafer thickness, reduce material requirements, increase production yield and increased cell efficiency. Each of these factors will lower the overall cost of silicon solar cell technology. Technical objectives include: Assemble pilot scale manufacturing of metallic, particle based ink materials suitable for direct, non-contact printing onto silicon solar cells; scale manufacturing output of metallic particle based ink materials to a capacity of 5 Kg per day; setup quality control measures required to ensure batch uniformity and solar cell performance of large batch size ink materials; and penetrate solar cell manufacturing market to have ink materials used in wafer production.

Conditions: None

Categorical Exclusion(s) Applied: B3.6, B5.1

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*-For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, see Subpart D of 10 CFR10 21

This action would not: threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including DOE and/or Executive Orders; require siting, construction, or major expansion of waste storage, disposal, recovery, or treatment facilities, but may include such categorically excluded facilities; disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; or adversely affect environmentally sensitive resources (including but not limited to those listed in paragraph B.(4)) of Appendix B to Subpart D of 10 CFR 1021). Furthermore, there are no extraordinary circumstances related to this action that may affect the significance of the environmental effects of the action; this action is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.

Based on my review of information conveyed to me and in my possession (or attached) concerning the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

ORO NEPA Compliance Officer **James L. Elmore** Date Determined: 9/14/2010