AGREEMENT BETWEEN THE DEPARTMENT OF ENERGY OF THE UNITED STATES AND THE MINISTRY OF ENERGY AND INFRASTRUCTURE OF ISRAEL IN LUMINESCENT PLANAR SOLAR COLLECTORS

This AGREEMENT is entered into between the Department of Energy of the United States (the "DOE") and the Ministry of Energy and Infrastructure of Israel ("MOEI") in Energy Research and Development in Luminescent Planar Solar Collectors (hereinafter referred to as the "Agreement").

ARTICLE I. OBJECTIVES

The objectives of the Project are to explore the characteristics of different candidate combinations of ions and glasses and to develop the optimum combination of ions and glasses into an efficient and cost-effective luminescent solar collector (LSC) system. The expertise of MOEI and DOE (hereinafter called "the Parties") will be employed in the study of the characteristics of inorganic ion species in glass hosts.

ARTICLE II. WORK SCOPE

To accomplish these objectives, a three-year collaborative research and development Project will be undertaken between the Parties. The scope of the work under this Project will include the following Tasks:

(a) Each Party will select, using theoretical analysis, sets of ions and glasses to study. The selection criteria will be that the glass matrix surrounding the ion positions the luminescent bands of the ion for the desired absorption, optimizes the quantum efficiency of the ion, minimizes the overlap between absorption and emission bands, and reduces non-radiative relaxation. Joint discussions will be held prior to beginning of the experimental study regarding the selected sets.

Each Party will undertake theoretical studies of chemical compositions of its selected sets of ions and glasses. During this task, the Israeli principal investigator will visit the U.S. for about two months. There will be an exchange of information resulting from such studies between the Parties.

(b) Each Party will fabricate small test specimens for spectroscopic analyses. Each Party will undertake spectroscopic analyses including measurements of the quantum efficiencies, the emission and absorption spectra and, if deemed necessary by the Parties, the relaxation times which determine the mechanisms and efficiencies of energy transfer. By variation of the concentration of ions and modifiers, the luminescent properties of the best doped glass compositions will be optimized.

The Parties will jointly choose samples to enlarge. DOE will fabricate larger plates of these samples and create prototype LSC systems. DOE will make measurements of the power conversion efficiency of these prototype LSC systems. The Israeli principal investigator will visit the United States for a mutually agreed upon period for joint experiments with the prototype LSC systems.

(c) Both Parties will undertake investigations, with regard to the prototype LSC systems fabricated as in task (b) above, of hybrid organic/ inorganic plates using combinations of inorganic ion/glass trapping plates and organic molecule/hosts in order to increase the light absorbances and quantum efficiencies of the prototype LSC systems.

During this task, there will be visits by the Israeli principal investigator to the U.S. for a mutually agreed upon period of time. During these visits to the U.S., joint experiments will be performed by DOE and MOEI.

(d) DOE will fabricate plates greater than 1000 cm^2 of the LSC system chosen by both Parties from among the prototype LSC systems developed and fabricated in Task (c) above. DOE will optimize the geometry of the chosen prototype LSC system, with MOEI assistance, to obtain the best possible efficiency. DOE will design a complete large-area LSC/solar cell module in order to investigate module losses (electrical connections, thermal losses, cooling problems, and the like) and to evaluate the overall system performance.

ARTICLE III. SCHEDULE, MILESTONES AND REPORTING REQUIREMENTS

A set of checkpoints will be developed and published during the first three months of this Project which will allow for periodic assessment of Project progress and direction, and facilitate mutually agreed written modification, expansion, contraction or termination of the Project. The major milestones for this Project include:

1. Identification of the first set of ion/glass combinations which absorb a major portion of the solar spectrum.
2. Demonstration of one or more ion/glass combinations which have a measured quantum efficiency greater than 10 percent and principal narrow-band emission in the infrared.
3. Optimization of ion/glass combination quantum efficiency.
4. Demonstration of a prototype LSC system which has an overall solar to electric power conversion efficiency greater than 6 percent and a concentration ratio, when scaled up, greater than 10.

The Project Leaders in each country will provide brief quarterly reports to the Project Coordinator in his country which will note the status of the Project with respect to schedules, milestones and budgets. These quarterly reports will be made available promptly to the Project Coordinator in the other country. A detailed annual report will be jointly prepared by the two Project Leaders describing the work done, results achieved, funds expended and milestones completed. An assessment of progress made in light of the adopted set of checkpoints will be included.

ARTICLE IV. MANAGEMENT

(a) Overall responsibility for annual approval of the Project's technical content and budget will rest with the Parties.

(b) Each Party shall appoint a Project Coordinator to act on its behalf in all matters concerning cooperation under this Agreement.

(c) Each Party shall appoint a Project Leader for the detailed management of this project. The Project Leaders shall be responsible to their respective Project Coordinator for the working contacts between Parties.

ARTICLE V. FUNDING

(a) The total costs estimated for this Project is $290,000 per year for each of three years from the date of signature of this agreement, with DOE providing $220,000 and MOEI providing $70,000. DOE will provide $120,000 per year of its total to MOEI, and the rest will be spent in the United States. DOE and MOEI will agree on a budget for the remainder of U.S. Fiscal Year 1980 as part of the initial activities under Article III.

(b) The cost of meetings will be borne by the Party which incurs them, and visits and assignments of personnel will be borne by the Party sending the personnel, both in accordance with the normal procedures of each Party. During extended work periods in the U.S., the Israeli Principal Investigator may be retained as a consultant by the DOE Contractor.

(c) Funds which DOE will provide for this Project which are to be expended in Israel shall be deposited with an authorized depository of MOEI in an account at the beginning of each quarter of the U. S. Fiscal Year during which the project activities are to be funded. Subject to established fiscal controls of MOEI, the Israeli Project Coordinator shall cause said funds to be distributed as is necessary and convenient to carry out the activities authorized herein.

(d) The Parties will maintain appropriate financial records of this Project which will clearly account for all funds expended on this Project, including funds transferred from one Party to the other pursuant to V (c) above. Either Party receiving funds from the other shall, within 3 months following the end of the other's fiscal year, provide the other with a certification common at its agency of the amount and use of funds provided by the other Party which were utilized

ARTICLE VI. INFORMATION AND INTELLECTUAL PROPERTY

(a) The publication, distribution, handling, protection and ownership of information and intellectual property, and rules and procedures related thereto, not covered by this Agreement shall be determined by the Parties by unanimity.

(b) Subject to the restrictions applying to patents, copyrights and proprietary information, the Parties shall have the right to publish all information provided to or arising from the Project. For the purpose of this Annex, proprietary information will mean information which contains trade secrets or commercial or financial information which is privileged or confidential. Information will be considered as proprietary information if it:

(1) Is not generally known or publicly available from other sources;

(2) Has not previously been made available by the owner to others without obligation concerning its confidentiality; and

(3) Is not already in the possession of the recipient Parties without obligation concerning its confidentiality.

(c) It will be the responsibility of the Party providing information to the Project to identify information it furnishes which qualifies as proprietary information under paragraph (b) and ensure it is appropriately marked in accordance with paragraph (e) of this Article VI. The Party creating arising information which discloses or reveals proprietary information shall also have the responsibility to so mark such information. Whenever proprietary information is orally communicated, the individual communicating such information shall place the recipient on notice as to the proprietary nature of the information. The Parties will take all necessary measures in accordance with this Article VI, the laws of their respective countries and international law to protect proprietary information. If either Party becomes aware that it will be, or may be reasonably expected to become unable to meet the non-dissemination provisions of this Article VI, it shall immediately notify the other Party.

(d) Proprietary information provided to or arising from the Project work of one Party, which is transferred to the other Party, shall not be disseminated by the receiving Party except to:

(1) Persons within or employed by the Receiving Party and concerned Government departments and agencies in the country of the Receiving Party having responsibilities related to the technology of the Project; and

(2) Prime or subcontractors of the Receiving Party located within the geographical limits of the Receiving Party's nation, for use only within the framework of their contracts with the Receiving Party in work relating to the subject matter of the proprietary information; provided, however, that any proprietary information so disseminated shall be pursuant to an agreement of confidentiality and shall be marked in accordance with paragraph (e) of this Article VI. The owner of the proprietary information will be informed of each prime or subcontractor to receive proprietary information under such an agreement 30 days prior to the dissemination.

(e) Any document which contains proprietary information shall be clearly marked with the following (or substantially similar) restrictive legend:

> "This document contains proprietary information furnished in confidence under an Agreement dated _____ between the United States Department of Energy and the Ministry of Energy and Infrastructure of Israel, and shall not be disseminated or used except as provided for in the Agreement without the approval of _____. This notice shall be marked on any reproduction hereof, in whole or in part."

(f) The Parties will notify each other of any pre-existing proprietary information, or proprietary information developed independently of

this Project, which will be used in the Project and which is necessary for the understanding of the Project results. Such information shall not be exchanged except by mutual agreement of the Parties under the terms and conditions set forth in this Article VI.

(g) Information arising in the course of or under the Project ("arising information") which does not disclose or reveal pre-existing proprietary information will be freely available to both Parties for use and dissemination. A Party possessing information regarding inventions on which patent protection is to be obtained shall notify the other Party and thereafter such information shall not be published or publicly disclosed until a patent application has been filed, provided, however, that this restriction on publication or disclosure shall not extend beyond six months from the date of notice to the other Party under this paragraph. Such information shall be appropriately marked to restrict publication or disclosure.

(h) Reports containing arising information and information developed prior to or outside the Project necessary for and used in the Project, including proprietary information, will be exchanged by the Parties and will cover the work performed by each Party under this Project.

(i) Inventions made or conceived in the course of or under this Project ("arising inventions") will be owned by MOEI in Israel and by DOE in the United States. Each Party, its Government and the nationals of its country designated by it, shall receive a royalty-free, non-exclusive license in the other Party's country.

In third countries, arising inventions shall be owned by the country of the inventor. In the case of an invention having joint inventors from each country, the Parties shall equitably allocate the rights to such an invention according to the contributions of the Parties and the inventors. In any event, the Party owning an invention in a third country shall grant to the other Party, its government, and the nationals of its country designated by it, a non-exclusive license on reasonable terms and conditions.

(j) Each Party may take appropriate measures necessary to protect copyrightable material generated by it under this Project. Copyrights obtained will be the property of that Party; provided, however, that the other Party may reproduce and distribute such material, but will not publish it with a view of profit.

(k) Each Party will, without prejudice to any right of inventors or authors under its national laws, take all necessary steps to provide the co-operation of its authors and inventors required to carry out the provisions of this Article VI. Each Party will assume the responsibility to pay awards or compensation required to be paid to its employees according to the laws of its country.

ARTICLE VII. OTHER AGREEMENTS

The Provisions of this Agreement shall not affect the rights or duties of the Parties under other agreements or arrangements. This Agreement also in no way precludes commercial firms or other legally constituted enterprises in each of the two countries from engaging in commercial dealings in accordance with the applicable laws of each country; nor does it preclude the Parties from engaging in activities with other governments or persons.

ARTICLE VIII. LAWS AND REGULATIONS

Activities under this Agreement shall be in accordance with laws and regulations of the countries of the Parties. All questions related to the Agreement shall be settled by the Parties by mutual agreement.

ARTICLE IX. APPROPRIATED FUNDS

It is understood that the ability of the Parties to carry out their obligations under this Agreement is subject to the availability of appropriated funds.

ARTICLE X. TERM

(a) This Agreement shall enter into force upon signature, shall continue in force for a three-year period, and may be amended or extended by mutual written agreement of the Parties.

(b) In the event that, during the period of this Agreement, the nature of either Party's energy programs should change substantially, whether this be by expansion, reduction, transformation or amalgamation of major elements with the energy program of a third Party, either Party shall have the right to request revisions in the scope and/or terms of this Agreement.

(c) This Agreement may be terminated at any time at the discretion of either Party, upon six months advance notification in writing by the Party seeking to terminate the Agreement. Any such termination shall be without prejudice to the rights which have accrued under this Agreement to either Party up to the date of such termination.

Done at Washington, D.C. in duplicate

the 1st day of August, 1980.

For the Department of Energy
of the United States of America

For the Ministry of Energy and
Infrastructure of Israel