Project Introduction
The long-term objective of this program is to develop flexible, lightweight, single-junction solar cells using quantum structured designs that can achieve ultra-high efficiencies (approaching 45%) while avoiding the current matching issues that plague high-efficiency multi-junction devices. Ultra-low dark currents and record-high open circuit voltages have recently been achieved with a novel III-V material structure that includes both an InGaAs quantum well absorber and an extended wide band gap emitter. By enhancing absorption in the narrow band gap well, power conversion efficiencies in single-junction quantum solar cells can potentially exceed those of multi-junction photovoltaic devices. The objective of the Phase I SBIR effort is to design and prototype a high performance quantum well solar cell device incorporating advanced light trapping techniques. To enhance light trapping, we will leverage both an established epitaxial liftoff process and unique optical coatings to scatter light laterally into waveguide modes within the InGaAs well region of the device.

Primary U.S. Work Locations and Key Partners

<table>
<thead>
<tr>
<th>Organizations Performing Work</th>
<th>Role</th>
<th>Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Glenn Research Center(GRC)]</td>
<td>Lead Organization</td>
<td>NASA Center</td>
<td>Cleveland, OH</td>
</tr>
<tr>
<td>Magnolia Solar, Inc.</td>
<td>Supporting Organization</td>
<td>Industry</td>
<td>Woburn, MA</td>
</tr>
</tbody>
</table>
### Primary U.S. Work Locations

| Massachusetts | Ohio |

### Closeout Documentation

Final Summary Chart

(https://techport.nasa.gov/file/14166)

### Project Management

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Jennifer L Gustetic

**Program Manager:**
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