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## Light-Induced Aluminum Plating on Silicon for Solar Cell Metallization

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SI Case #M17-216P

### Inventors

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### Background

Solar cells have become increasingly prevalent, efficient, and affordable over the last decade. However, a significant portion of the cost of solar cell production is determined by the cost of silver. Silver is used to transmit electrons within the solar cells. Silver is highly conductive and has very low resistivity but there is a limited global silver reserve; therefore, more cost-effective metals are being explored as alternatives. One alternative, copper, possesses extremely low resistivity but has exhibited detrimental performance issues. Another alternative, aluminum, is promising because it is inexpensive, highly conductive, and does not impact performance. Unfortunately, a prohibitively expensive manufacturing process was historically necessary to integrate aluminum into the solar cells. To attain the numerous advantages of use of aluminum in solar cells, a novel and scalable manufacturing technique which reduces cost over previous methods is needed.

### Contact

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### Invention Description

Researchers at ASU have developed a method to use light to plate aluminum directly onto silicon solar cells under mild conditions. Experimental evidence has shown that the aluminum grown in this fashion has a resistivity of only five micro-Ohms cm; this is better than that of screen-printed silver. The illumination-based growth of aluminum on silicon significantly reduces the cost typically associated with traditional aluminum based manufacturing. Excitingly, this method is also applicable towards more complex silicon solar cells as well. Furthermore, this technique lends itself towards large scale processing methods.

### Potential Applications

- Solar Energy
- Silicon Solar Cells
- Light Emitting Diodes
- Integrated Circuits

#### Benefits and Advantages

- Lower Costs – cell production costs reduced by a projected 10%
- Large Scale - cost effective terawatt-scale deployment of wafer-silicon solar cells
- Manufacturability - simplified cell fabrication process; neither barrier nor protective layer is needed
- Versatility - Panels are better suited for deployment in humid climates
- Retrofit - Process can be applied to existing solar cell production facilities

#### Professor Tao's Information