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Subject Number 2.2: Silicon Solar Cell Improvements

**LIGHT INDUCED ELECTROLESS PLATING OF SILVER FOR EFFICIENCY IMPROVEMENT AND COST REDUCTION OF SILICON SOLAR CELLS**

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**SUMMARY:**

Front side screen printing of silver paste for conductor formation remains widespread in the solar cell industry. However, screen print technology suffers from drawbacks including poor aspect ratio, excessive shading, and inefficient usage of silver metal. In an effort to increase silicon solar cell efficiencies while simultaneously reducing production costs, a two-step metallization process was installed for the production of multi- and monocrystalline silicon solar cells. The use of a novel, cyanide-free electroless silver plating solution (LIEP – light induced electroless plating) allows cell fabricators to increase efficiencies of poorly conducting cells, as well as reduce overall silver consumption by printing fine line patterns and thickening the contacts with wet chemical metallization. The LIEP silver plating solution reduces capital costs as compared with alternative LIP deposition, due to simplified equipment requirements. The LIEP silver deposit is denser than sintered paste, providing a platform for improved soldering, increased ribbon peel strength, and improved module reliability. Through simple reduction of screen printed fingers and LIEP deposition, the quantity of paste needed was reduced by 70%. Resultant finger widths decreased, allowing for  $I_{sc}$  and power gains. Experimentation with custom seed pastes and alternative patterning technologies allows for the use of higher resistance, homogeneous emitters, which promise even greater performance and economic benefits.