IAF SPACE POWER SYMPOSIUM (C3)
Solar Power Satellite (1)

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USE OF THE MOON TO FABRICATE SOLAR CELLS FOR SPACE SOLAR POWER SATELLITES

Abstract

The abundance of raw materials on the Moon and the much lower gravity well as compared to the Earth presents the unique opportunity of utilizing lunar resources for the fabrication of solar cells to be used for orbiting space solar power satellites. Further, the current surge in space manufacturing interest bodes well for such space manufacturing of solar cells. The raw materials needed for solar cell fabrication are to be extracted from the lunar regolith by molten oxide electrolysis – an extraction technique which essentially does not require any reagents from Earth as most other techniques do. Elements such as silicon, aluminum, and others can be processed from the regolith and then utilized to fabricate solar cells. A number of options are available for space solar cell fabrication including both crystalline and non-crystalline cells with compositions varying from silicon to compound semiconductor. In addition, the solar cell manufacturing process can be varied from fabrication on the moon and launch for installation in a solar power satellite, to fabrication directly in space vacuum as part of the solar power satellite assembly. Further, such space solar cell manufacturing has the major benefit of direct replacement/repair of cells damaged in the space environment by micrometeorites or other damaging causes as it does not require shipping additional mass from Earth. The direct fabrication of solar cells in space from lunar materials can lead to energy rich cis-lunar space environment.