

IAF SPACE POWER SYMPOSIUM (C3)
Space Power System for Ambitious Missions (4)

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IN-SITU RESOURCED SOLAR POWER GENERATION AND STORAGE FOR A SUSTAINABLE
MOON VILLAGE**Abstract**

The Moon Village and similar concepts are strongly reliant on in-situ resource utilisation (ISRU), primarily associated with the extraction of water and oxygen from regolith ice and lunar minerals respectively. However, there is great interest in harvesting solar power locally leveraged from in-situ resources. To that end, there has been interest in “printing” solar cells from lunar regolith using a heat source – nominally a Fresnel lens, mirror or laser – mounted on a rover which traverses the lunar surface fusing regolith into solar cells. There are several potential difficulties with this notion: (i) anorthite yields lunar glass at high temperatures which will be coloured by iron impurities; (ii) pure silica is rare on the Moon where it will be in silicate form unlikely to yield Si with sufficient purity for solar cells; (iii) although group III acceptor dopant Al may be extracted from the lunar mineral anorthite, group V donor dopant P will be much more difficult to extract from KREEP minerals and will require supply from Earth; (iv) the photovoltaic conversion efficiency from in-situ manufactured solar cells is unlikely to be ≥ 1