

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

Author: Mr. Sukhjit Singh
Space Generation Advisory Council (SGAC), India, sukhjitsingh9811@gmail.com

DEVELOPMENT OF A SMALL-SCALE ENERGY GENERATION SYSTEM ON MARS USING
FORMIC ACID**Abstract**

Given the long-term viability of human civilization on Mars, there is a need for the development of cost-effective alternate energy sources other than solar and wind energy. The existence of the former would allow humans to reduce the costs of space missions while also providing efficient exploration of Mars. As a result, the development of such alternative sources is essential. In this paper, we propose a synthetic model for an alternative energy source that converts the carbon content of the Martian atmosphere into chemical compounds that can then be synthesised for energy generation. The reaction of CO₂ results in the generation of formic acid, methanol, and methanal. The reaction's catalyst is GaP, and the chosen energy source for the reaction is a 365nm halogen lamp. The proposed model consists of a structure with a frequency cancelling system that only permits light with a wavelength of 365 nm to pass through. The incident light's energy content is used as an energy source for the carbon dioxide reaction with an electrode made of a single crystal GaP in 0.05 M K₂HPO₄/KH₂PO₄. The reaction produces formic acid, methanol, and formaldehyde as byproducts. Methanol can be further synthesised to generate energy through inflammation of its content. Formic acid can also be used to power fuel cells through its reaction with oxygen where its end products are energy, carbon dioxide, and water.