

# A Novel Study of the Potential Applications of Higher Efficiency Extraterrestrial Solar Cells

Kopp, Joshua (School: Wiregrass Ranch High School)

Extraterrestrial solar cell efficiency has only begun to be researched over the past few years, even though this topic is very important for the future exploration of our solar system. This research attempts to find a new combination of semiconductors that can be used in a solar cell that will increase its efficiency past the current industry standard. Using Python, a program that can calculate the efficiencies of solar cells based on the semiconductors that they are composed of will test the efficiencies of groups of triple, quadruple, and quintuple-junction solar cells. The efficiency of each cell will then be compared with a constant cell that is about 38% efficient, and the frequency that each semiconductor appears in a more efficient cell will be recorded. The final data has shown that out of over one thousand tested solar cells, the most efficient cell is composed of InN, FeS<sub>2</sub>, SnS, CIGS, and CH<sub>3</sub>NH<sub>3</sub>PbX<sub>3</sub>, which yields an efficiency of 87.09%, compared to the current industry standard of about 38%. Out of all the semiconductors that were tested, CdTe, CdSe, and CH<sub>3</sub>NH<sub>3</sub>PbX<sub>3</sub> appeared in the most cells with higher efficiencies, meaning that these are the ideal semiconductors to be used in the manufacturing of solar cells. The data also proved to be extremely statistically significant, with P-Values less than 0.001. This research should hopefully help to fill in our lack of knowledge of extraterrestrial solar panels, and serve as a starting point for future experimentation on multi-junction solar cells.