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EFFECTIVE USE OF TECHNOLOGY THAT WORKS WITH SEEBECK EFFECT ON THE MOON AND IN SPACE

Abstract

As during space exploration, the sharp difference between the temperature of space and the temperature of the Earth, creates difficulties for technology, by using this difference we can turn these problems that we face to our advantage. In space, the sun-facing surfaces of objects, which are exposed to sunlight, are exposed to high temperatures, in contrast their shaded surfaces are exposed to highly cold temperatures. This sharp temperature difference is also observed in the craters of the Moon. If we build generators in the craters of the Moon based on principles of Seebeck effect, we can use them as a power source in lunar missions. For this purpose, our aim is to expose one side of the materials with a high Seebeck coefficient to the heat outside of the crater and the other side to the cold temperature at the bottom of the crater, and using this temperature difference to obtain electricity. Here, in order to prevent to decrese the material's efficiency in conducting heat, the side of the material that is exposed to heat should be prepared wide, and divided into thin threads as it goes towards the cold side. That is why, the thin side of the wire will reduce the thermal conductivity of wire. These thin threads will not only conduct heat less, but also they will conduct current poorly as they will have high resistance. To avoid this problem, I propose integrating a superconductor into the cold side of wire. The cold bottom of crater has a sufficiently low temperature for superconductors to work. To increase the temperature difference a little bit more, the sun-facing side of wire can be treated with a special black material integration that will increase the absorption of solar radiation (for example, carbon nanotube coatings). The wires and generators should be covered with special capsules to protect them from lunar dust. The superconducting materials should be carefully selected for not to face with difficulties of the weak magnetic field of the Moon (YbaCuO or MgB_2). This idea I propose can be many times more effective than existing Seebeck-based technologies. It can generate sustainable energy on lunar missions and provide space systems with more efficient energy. It can even be applied to provide sustainable energy on Mars in the future, if the right conditions are created.