

## Solar-Powered Refrigeration

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**Categories:**

- Mechanical Engineering

**Keywords:**

- Cooling
- Electrons
- Graphene
- Heat Transfer
- LEDs
- Mechanical Engineering
- Refrigeration
- Solar
- Substrate
- Thermoelectric

Evaporation is an effective way of inducing cooling on an object's surface such as sweat cooling the human body. The water or working fluid that is evaporating is absorbing heat from the object and transferring it into the surrounding air.

Purdue University researchers have developed a refrigerator using this concept except instead of using a fluid, the device uses electrons to transfer heat. When the device is exposed to a light source, such as the sun or LEDs, electrons in the substrate evaporate to a collector. The movement of the electrons transfers thermal energy from the substrate to the collector, which results in the collector heating up while the substrate experiences refrigeration. Using the sun as the source of light allows this device to provide refrigeration using only solar power. In addition, it can be coupled with a solid-state thermoelectric generator to produce low-cost solar power. Because the materials for this device are inexpensive and the need for complex refrigeration or fluid-flow elements is eliminated, it is possible to make solar panels for refrigeration that are inexpensive and reliable.

**Advantages:**

- Inexpensive materials
- Uses solar energy

**Potential Applications:**

- Solar industry
- Solar panel manufacturers
- Refrigeration industry

**People:**

- Fisher, Timothy Scott (Project leader)

**Intellectual Property:**

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