

Using solar energy for cooking has been a historical interest of human beings either by pure curiosity or by the needs for living.

With the rising attention to the global environmental protection and a desire for renewable energy, developed countries are embracing more and more the idea of solar cooking and utilization of solar power. Therefore, a higher standard on the solar cookers could be projected because of the higher living standard of people in these countries. The customer requirement of such high standard solar cookers may include: unintended autonomous solar tracking, high safety and reliability, no exposure to sunlight for people who use the solar stove, and the comfortable feeling of using a solar stove as like using a regular electrical or gas stove.

With the funding awarded by the US Environmental Protection Agency, the Energy and Fuel Cell Lab (Directed by Dr. Peiwen (Perry) Li ) at the University of Arizona has developed an innovative prototype solar stove which could meet the standard as mentioned above. In this solar stove, a giant Fresnel lens was used to focus sunlight onto a fixed small heat-collecting area, from which heat is conducted to a larger stovetop surface. The system has a two-axis solar tracking mechanism with very low power need (using batteries or a small solar panel). A giant Fresnel lens was chosen to pursue several advantageous features: (1) large Fresnel lens are popular optical items nowadays for large TV screens which are commercially available at low cost, (2) the sunlight focus point and the stovetop in this design are behind the lens and therefore the sunlight will not be blocked by the person who cooks using the stovetop, (3) the heat conduction in the stove can be properly designed to separate the sunlight focus point from the person who uses the stovetop, (4) a sunlight shield/shelter may be attached to the stove to keep the stove-user from being burned by the sunlight, (5) you have the feeling of using a normal stove for cooking except it uses solar energy. The following photograph shows the prototype solar stove.



(Provided by Dr. Peiwen Li)

Please download the technical papers about this solar stove by Dr. Peiwen Li's team.

1. [A novel application of a Fresnel lens for a solar stove and solar heating](#) *Renewable Energy, Volume 36, Issue 5, May 2011, Pages 1614-1620.*
2. [Modeling of solar tracking for giant Fresnel lens solar stoves](#) *Solar Energy, Volume 96, October 2013, Pages 263-273.*

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