

Hot Stone Cooking with an Ultralight Membrane Solar Concentrator

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Abstract: Over the last 3 years the Technology Team in Tamera's SolarVillage testfield has developed a 3,5m² high-precision solar concentrator. Its inflatable membrane technology using 100µm ETFE (Ethylene-tetraflouroethylene) film creates an excellent lightweight paraboloid form. The off-axis design allows the focus to remain stationary and close to the ground while the concentrator tracks the sun. The concentrated solar radiation falls into a well-insulated cavity receiver where it is absorbed. The precision optics create a small focus (< 6cm) making it possible to reach high temperatures and to minimize radiation and convection losses in the receiver due to the small area of the aperture. Black granite stones in the receiver serve as absorbing surface and as thermal storage. These 10 kg stones can be taken out of the receiver onto a cooking surface as needed, and each deliver about 30 minutes cooking time. After heating during the day, the aperture is closed and the thermal energy in the receiver can be stored over several hours. Depending on the stone temperature, cooking at night or in the early morning is then possible.

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