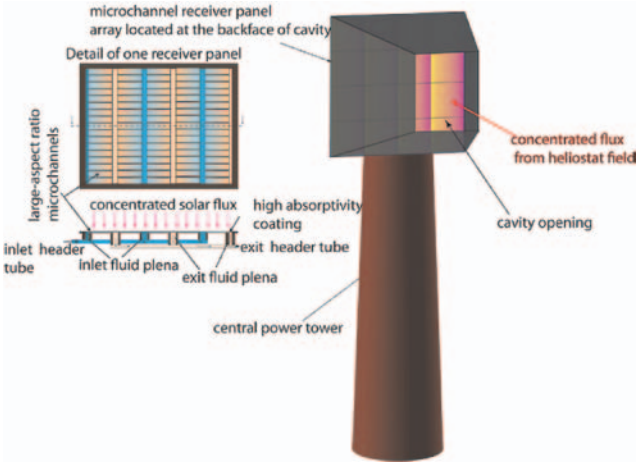
High-Flux Microchannel Solar Receiver

OREGON STATE UNIVERSITY	Oregon State OSU
PROGRAM:	SunShot CSP R&D 2012
TOPIC:	Advanced Receivers
LOCATION:	Corvallis, Oregon
AWARD AMOUNT:	Up to $0.8 million
PROJECT TERM:	2012–2014



The microchannel solar central receiver concept. *Illustration from Oregon State University*

MOTIVATION

In any heat transfer process, the residence time required for a fluid to come into equilibrium with the walls of a channel decreases with the square of the channel size. Generally, the size of a heat transfer device is directly related to the residence time of the fluid being heated. Consequently, the size and cost of a device decrease with the square of the channel size. This insight has led to the use of microchannels in a range of high-flux heat transfer applications.

PROJECT DESCRIPTION

This project takes advantage of the extremely high heat transfer rates afforded by microchannels. The researchers are demonstrating a microchannel-based solar receiver capable of absorbing high solar flux, while using a variety of liquid and gaseous working fluids. The objective is to design a supercritical carbon dioxide (s-CO_2) microchannel receiver that operates at a fluid exit temperature of 650ºC and is capable of absorbing an average flux of 100 W/cm^2 with a receiver efficiency of 90% or greater.

IMPACT

High-flux microchannel receivers have the potential to dramatically reduce the size and cost of a solar receiver by minimizing re-radiation and convective losses. Once proven, the microchannel solar receiver concept can be applied to a wide range of solar technologies, ranging from dish concentrators to solar central receivers.

CONTACTS

Project Leader:

Dr. Kevin Drost
kevin.drost@oregonstate.edu

Partnering Organizations:

- Pacific Northwest National Laboratory
- Diver Solar, LLC

For more information, visit the project page at: www.solar.energy.gov/sunshot/csp_sunshotrnd_oregon.html.

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