

Brian Schmit

SOURCE - Abstract Initial Draft

The addition of a compound parabolic concentrator (CPC) to the Valparaiso University Solar Furnace can increase the power per area, allowing for higher temperatures reactions to be run. The effect of the addition of the CPC was analyzed using a monte carlo ray tracing (MCRT) technique within MatLAB. A CPC uses a multi-parabolic geometry to focus light rays from a larger area to a smaller one, leading to more power input. The CPC will be placed in front of the reactor opening, which would have the same radius as the smaller end of the CPC. Minimizing the size of the reactor opening will decrease power loss through convection out of the opening, and increase the overall temperature. MCRT models a high amount of rays and their randomness to predict the potential percentage of rays that would enter the reactor, and therefore the power output. Using MCRT the potential effect of the CPC can be analyzed in comparison to the without the CPC. The addition of a CPC has the potential to increase the overall power output of the Solar Furnace without the need to increase the reactor opening, allowing for higher temperature processes to be performed.