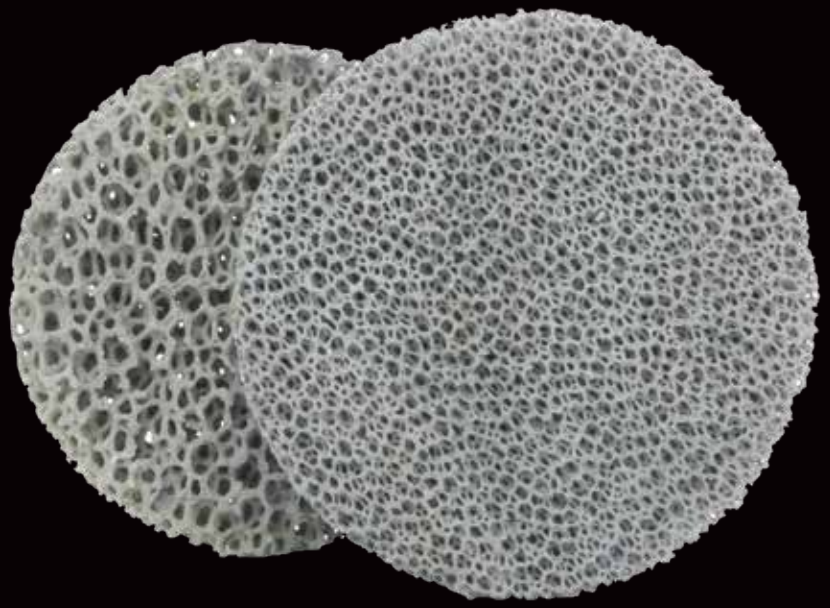
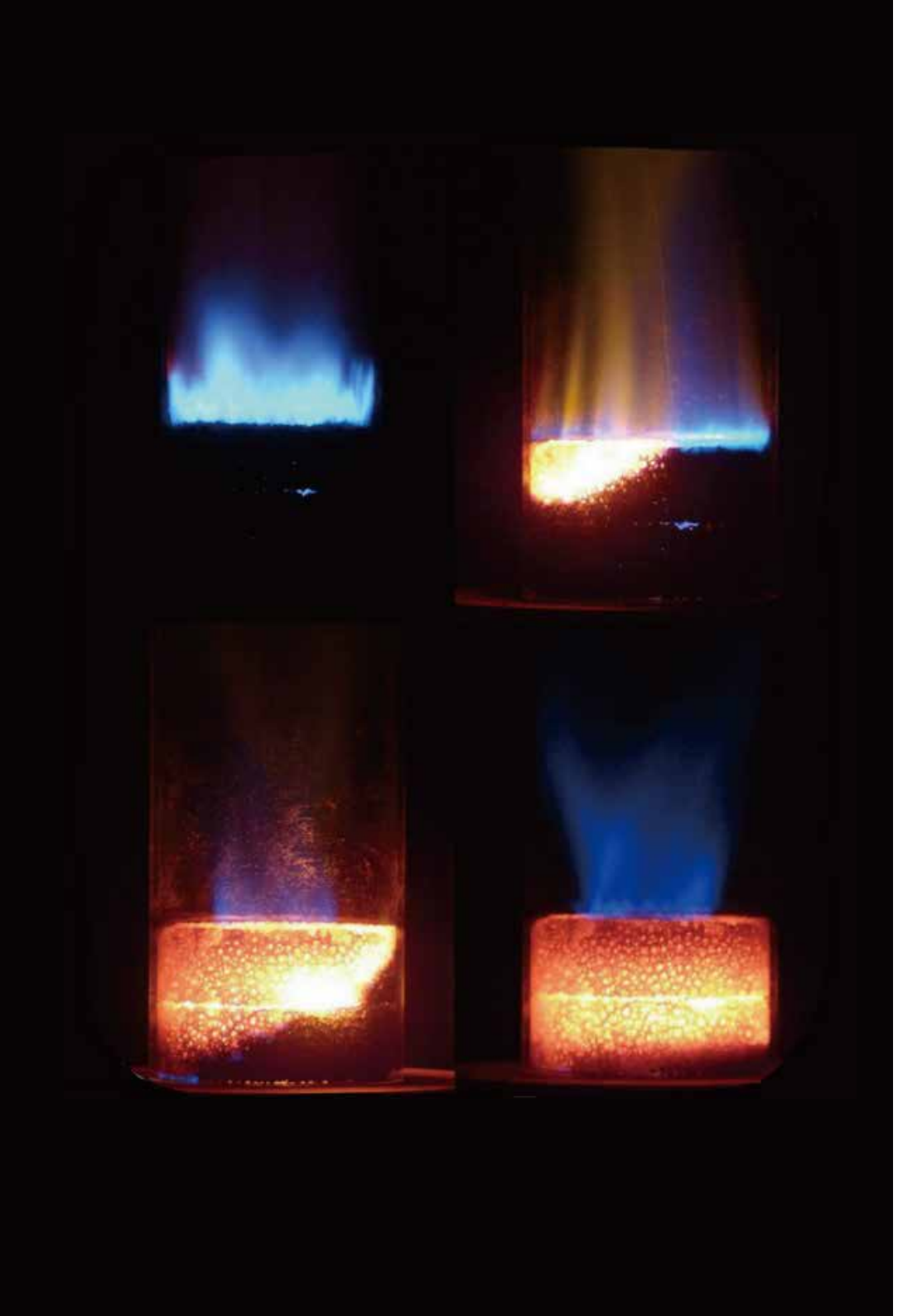
StandardCeramic

SiC Cermaic Foam Porous Media

High efficiency flameless burning





Why Ceramic Foam?

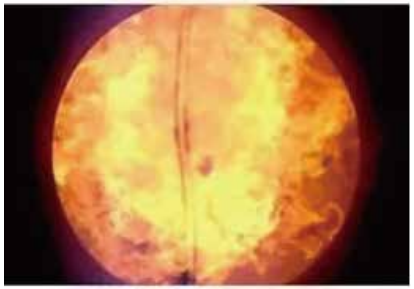
Ceramic foam structure has demonstrated high performance in the field of combustion burners beacause of its superior properties including good thermal shock resistance, thermal conductivity and high surface area.

Its large porosity, and extensive specific surface area results in its strong heat storage capacity. Heat radiation, convection, and conduction, all three heat exchange methods simultaneously spread heat evenly across the combustion zone, therefore maintaining a stable and homogeneous temperature gradient.

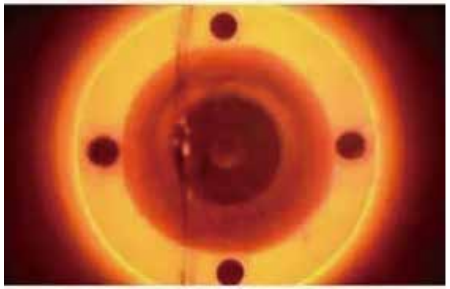
3D Network

Foamed Silicon Carbide (SiC) material has three-dimensional interconnected network structure, which creats large specific surface and high permeability. In combination of its high specific strength, our specially designed SiC foam can enhance the combustion efficiency by 50%.

Open Flame vs Porous Media Combustion (PMC)



Traditional Open Flame Burner



PMC Burner

Power Density	2MW/m^2	1~30MW/m^2
Range	1:6 max.	>>1:20
Temperature Homogenity	Uneven	Even
Customizability	Low	High
Radiant Efficiency	30%	80~90%

70%

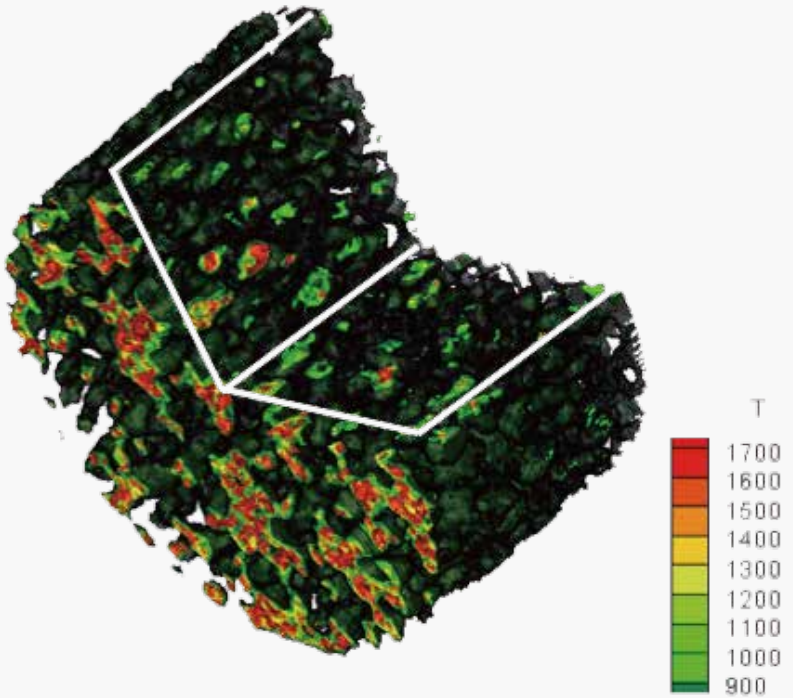
High burning efficiency
NOx and **CO** pollutant reduction up to 70%

50%

Higher $\mathbf{T_{Max}}$
Up to 50% more efficienct comparing to traditional method

x10

Burner/ heat exchanger **size reduction** up to 10 times



SiC Foam Matrix

High Temperature Resistance
No meltdown during high heat up to 1600° C

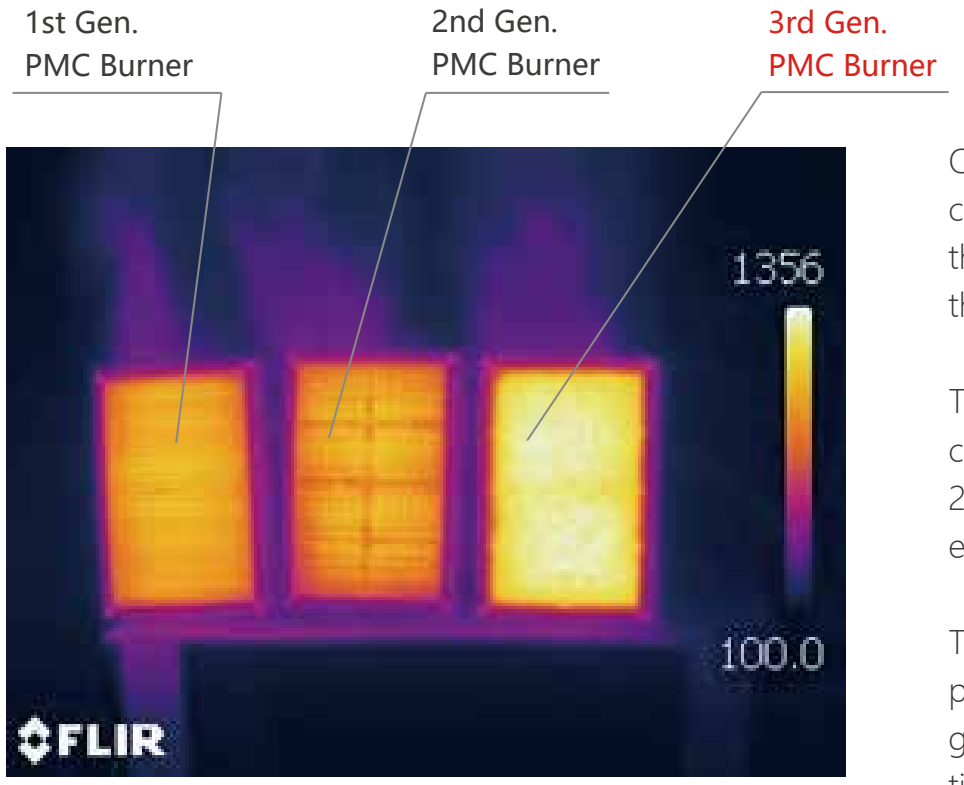
High Porosity
Customizable porosity
Maximized burning efficiency

Thermal Conductivity
Highly heat conductive
Homogeneous heat distribution

Porous Media Material
Techinical Comparison

	Unit	SiC	Al_2O_3	ZrO_2	FeCrAlY	Ni
Density	g/cm3	3.2	3.75	5.56	7.4	8.89
Thermal Conductivity (25℃)	W/(m*K)	120~140	20~40	2~5	15~17	~88
Thermal Conductivity (1000℃)	W/(m*K)	30~80	5~6	2~4	-	-
Specific Heat	J/(g*K)	0.7~0.8	0.9~1.0	0.5~0.6	0.7~0.8	0.75~0.85
Radiation Coefficienct (1200℃)	-	0.85~0.95	0.28	0.3	0.5~0.6	0.3~0.5
T_{Max}	℃	1600	1600	1600	<1100	<1100
Thermal Shock Resistance	-	Very Good	Poor	Good	Very Good	Very Good

3rd Generation PMC



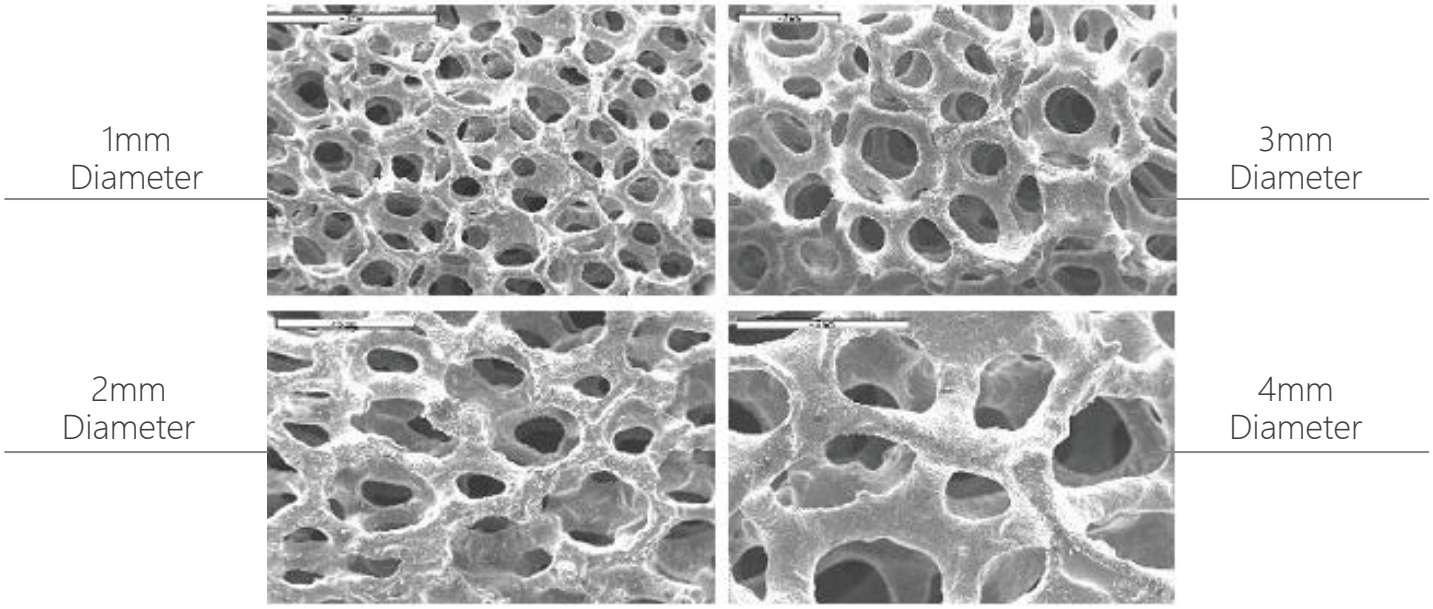
Our latest PMC SiC foam is compatible with the 3rd generation gas combustion technology, which can reach higher T_{Max} comapring to the 1st generation conventional gas combustion technology and the 2nd generation heat storage combustion technology.

The 3rd generation PMC SiC foam, under the same area conditions, can achieve the highest panel temperature 100 °C higher than the 2nd generation burner, and nearly 200 °C higher than the 1st generation burner.

The heat radiation rate per unit area is also higher. Under the same panel conditions, the burning power is 80% higher than the 2nd generation burner, and is more than double that of the 1st generation burner.

From the experimental results, the 3rd generation PMC burner has obvious performance advantages, the temperature of the panel peaks at 1,370 °C, and maintains stable combustion, this is especially suitable for situations that demands rapid radiant heating.

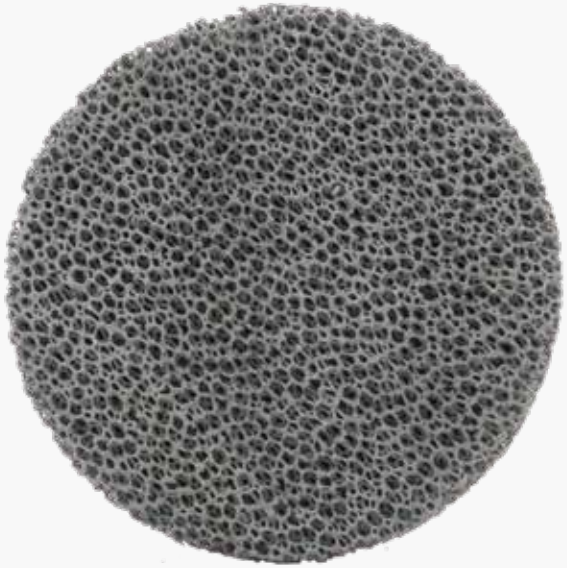
Customization
Porosity and Pore Size



Porosity and Pore Size

Customizable pore size and volume fraction.

Minimized blind hole, the solid phase volume fraction can be precisely controlled during manufacturing.



Customization

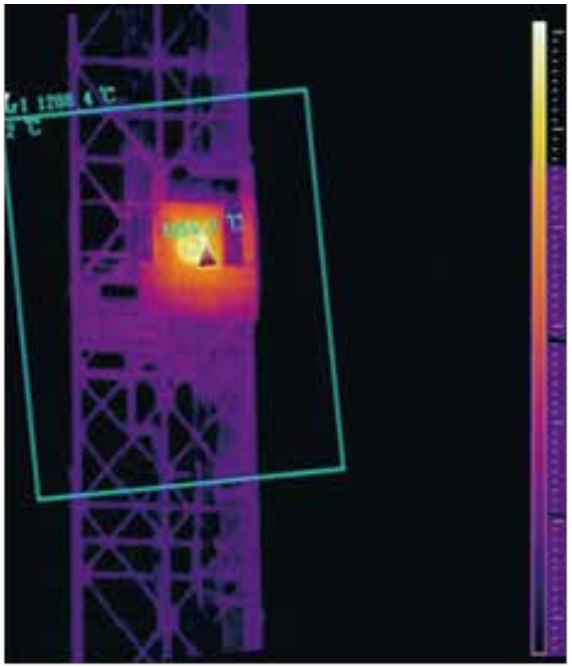
Size and Machinability

Precise machining is possible thanks to the high strength of SiC material. Our low deformation sintering technology maintains fine pore structure while keeping the module assembly structure, the result is the material’ s excellent heat absorbing capability.

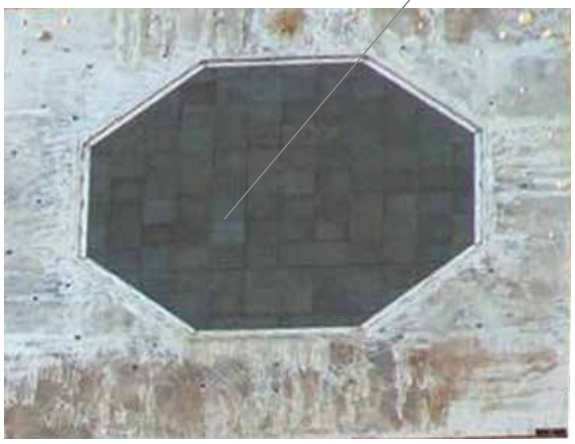
Hexagonal and quadrilateral foam SiC ceramic foam with various pore structure can be customized upon request. Flexible modular design is also available, which can be used for large surface construction.

Application
Case Study

1MW Solar Heat Exchanger assembly
at Yanqing Solar Farm, with surface area of 2.167m²



2.167 m²



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