High Efficiency Solar Fuels Reactor Concept

ARPA-E Open FOA Project: 0670-4875

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PIs

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Collaborators

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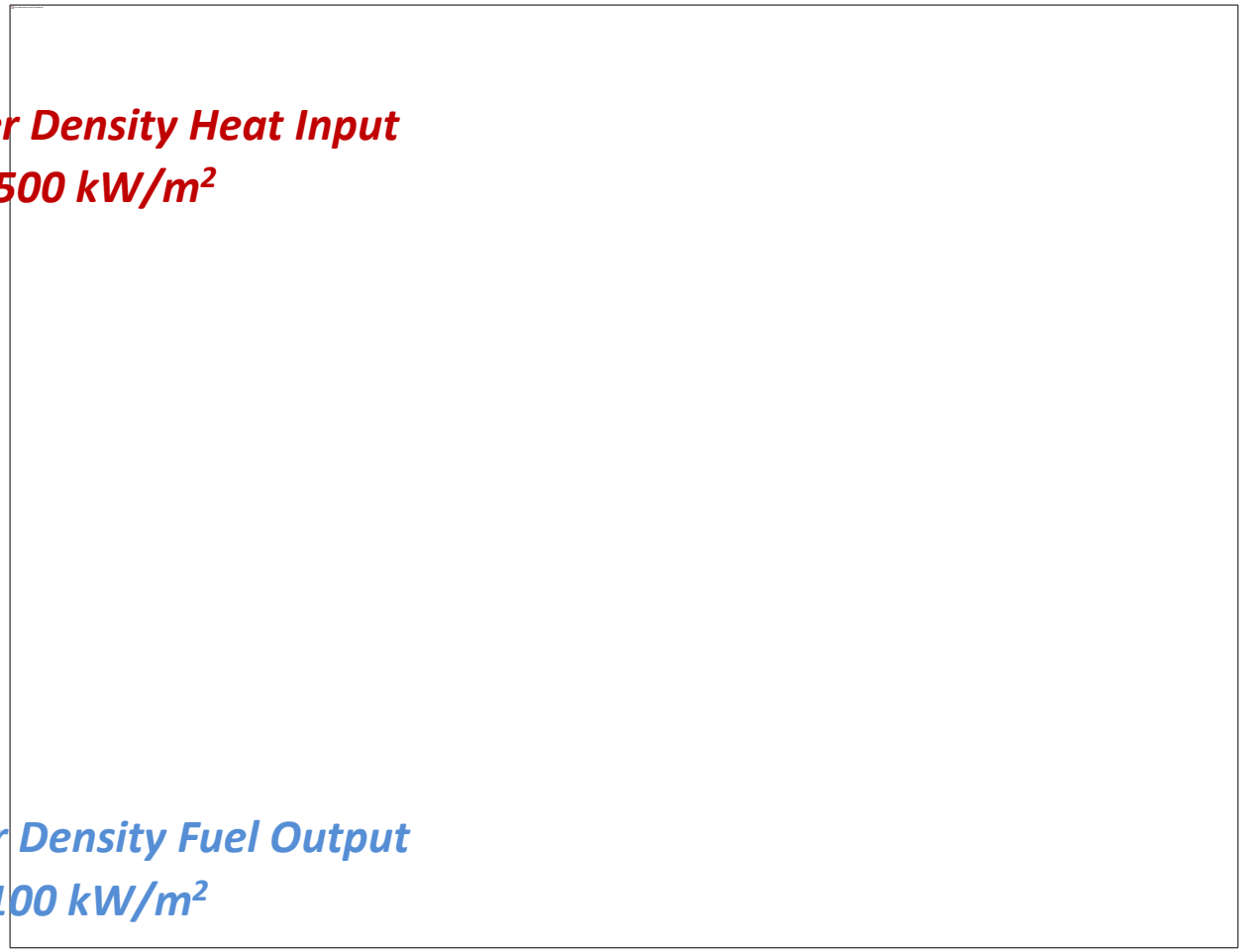
- University of Rochester
- Pacific Northwest National Laboratory
- Molten Metal Equipment Innovations Inc.
- MCubed Inc.

Outline

- Motivation
- Proposed Approach
- R & D Strategy
- Future Work
- Challenges

Direct Irradiation

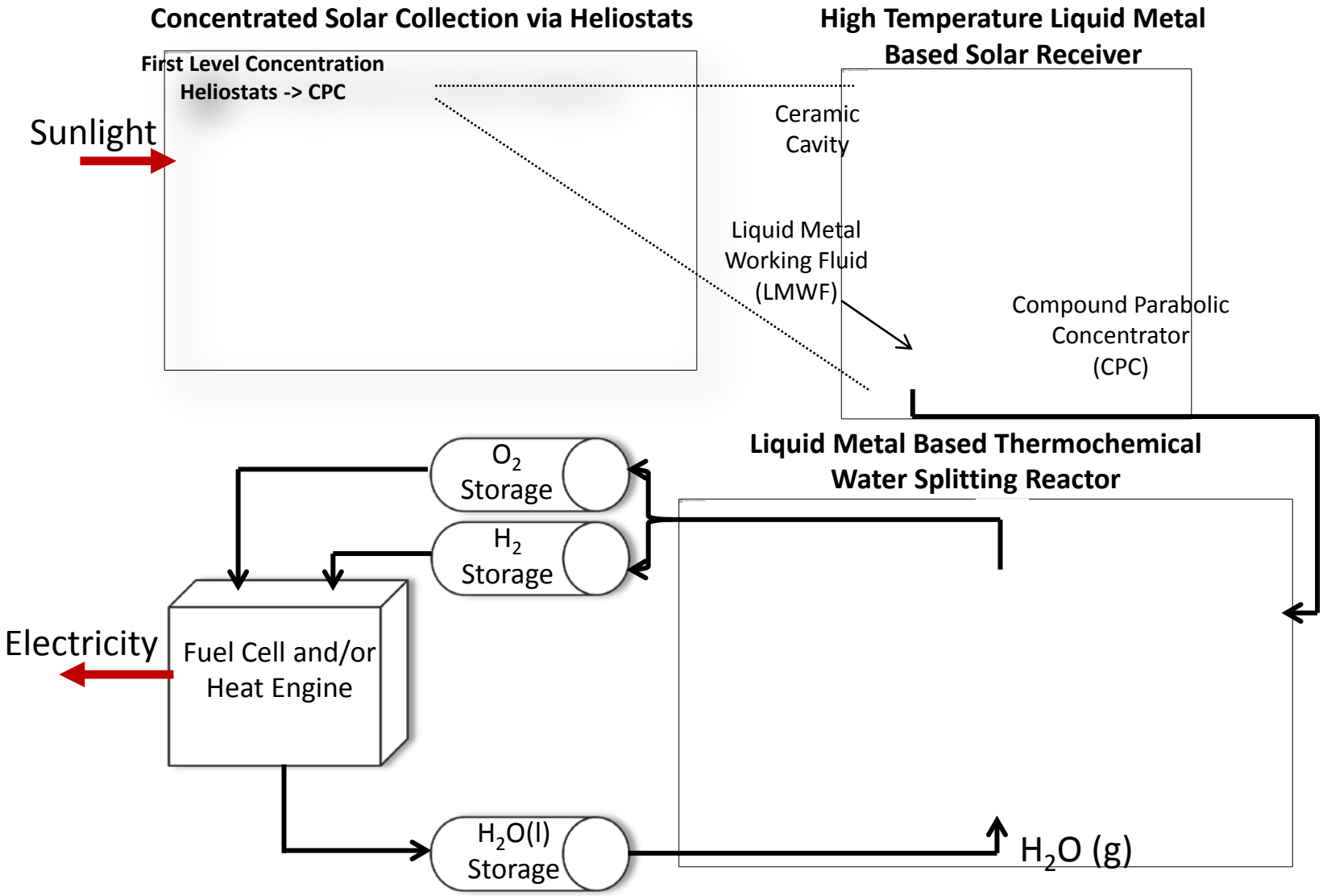


High Power Density Heat Input
> 2500 kW/m²

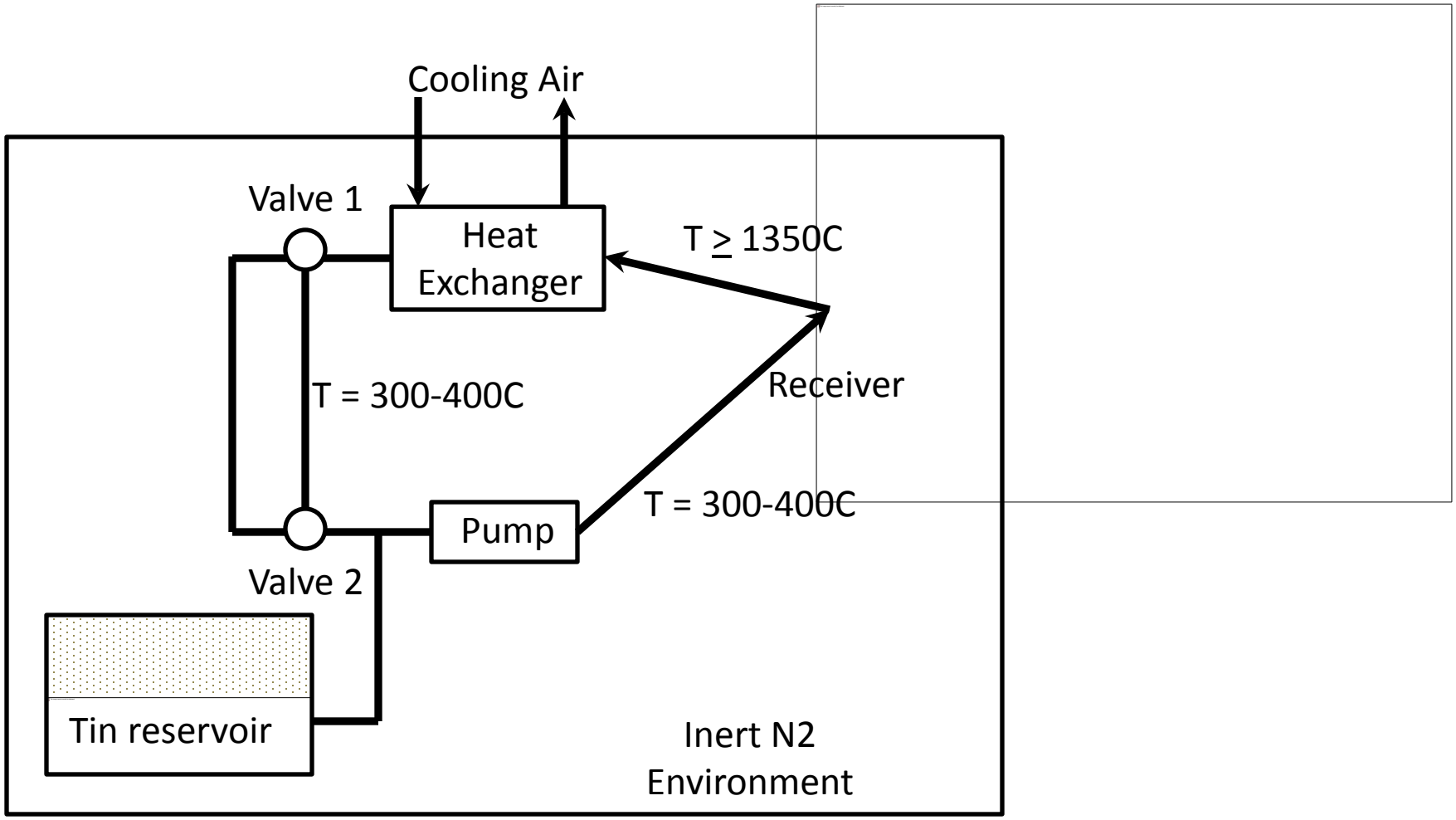
Low Power Density Fuel Output
< 100 kW/m²

http://landartgenerator.org/blagi/archives/415

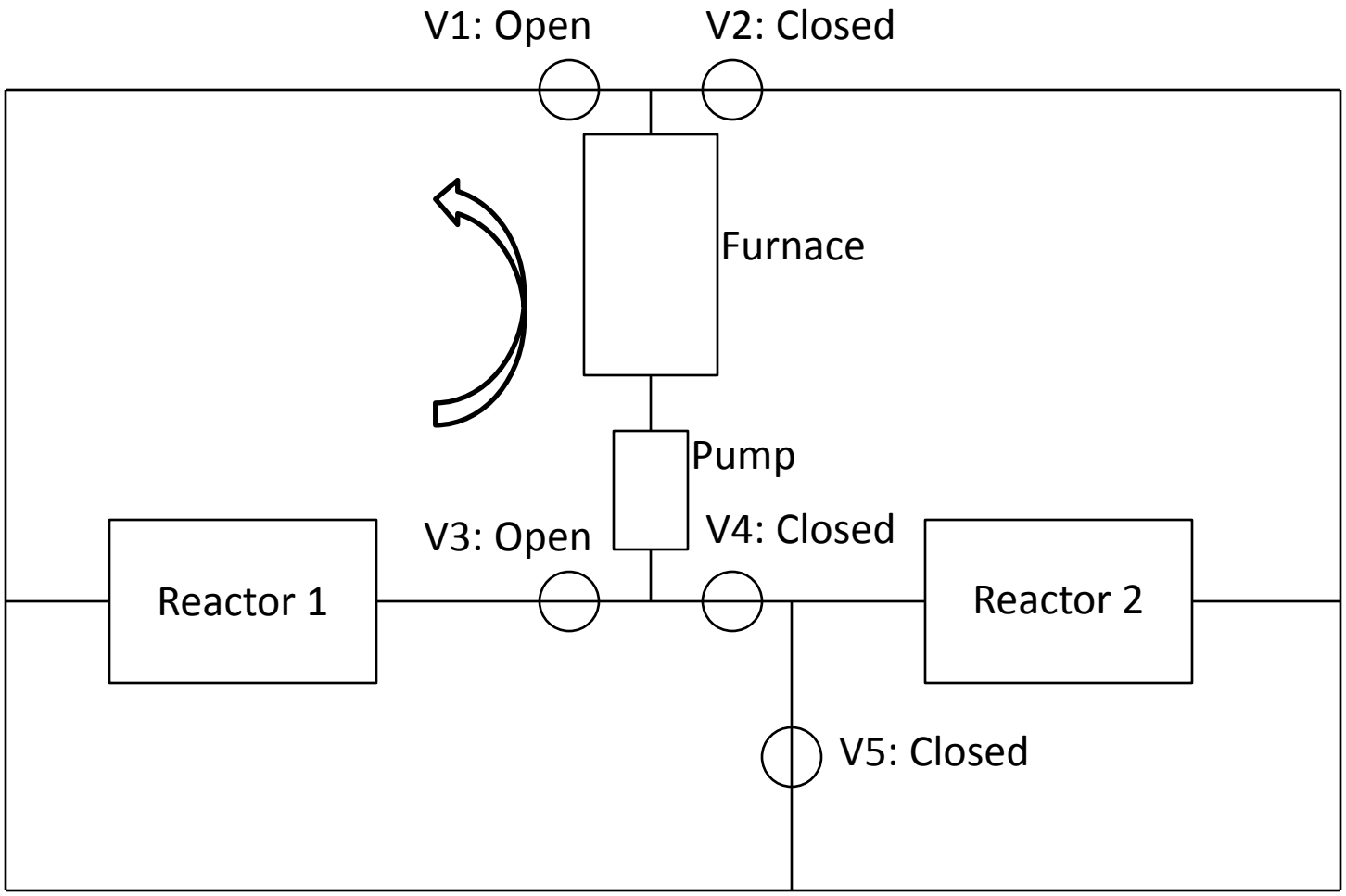
Solar Fuels Reactor Concept



Liquid Metal Receiver Prototype

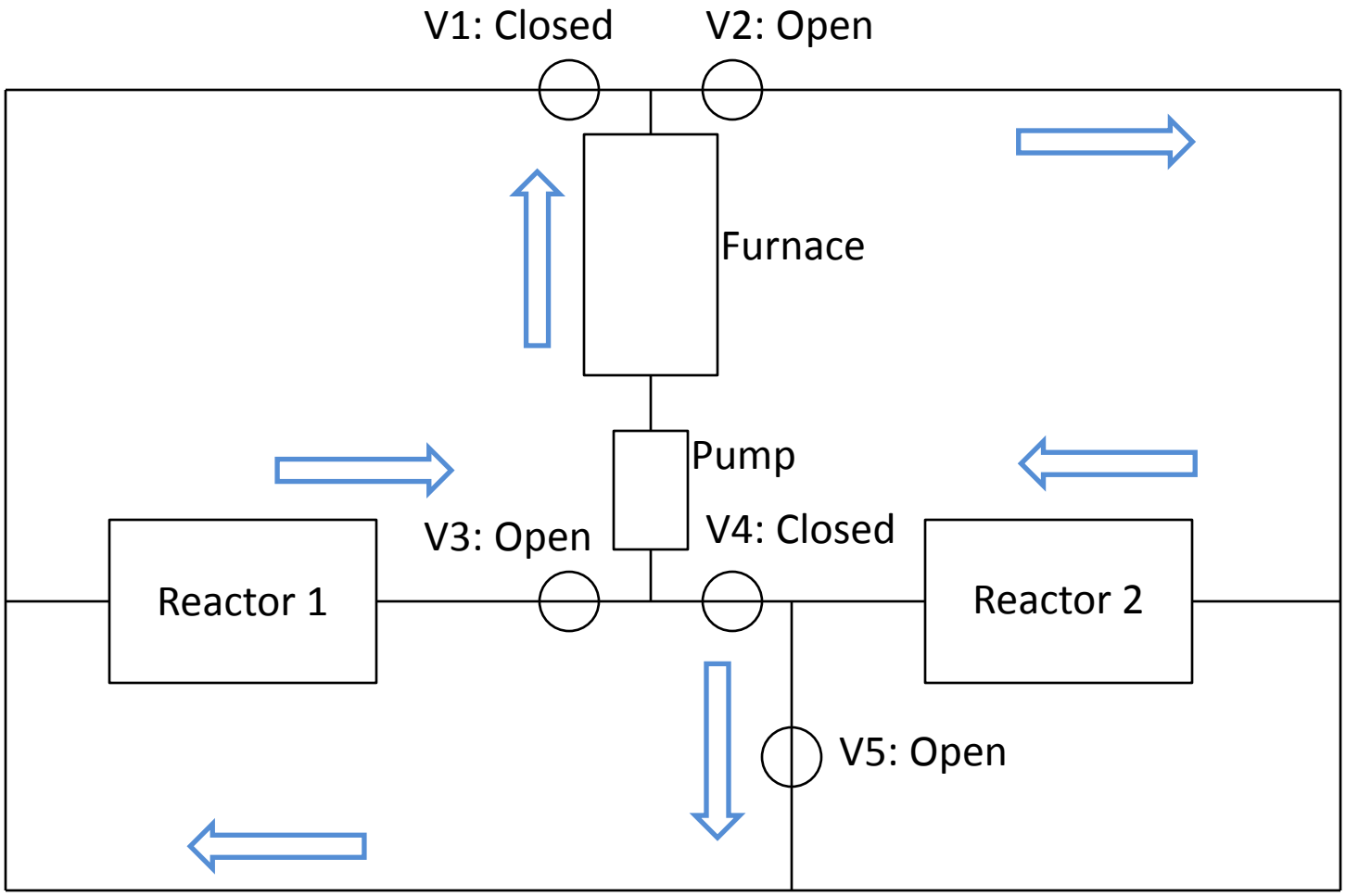


Thermochemical Reactor Prototype



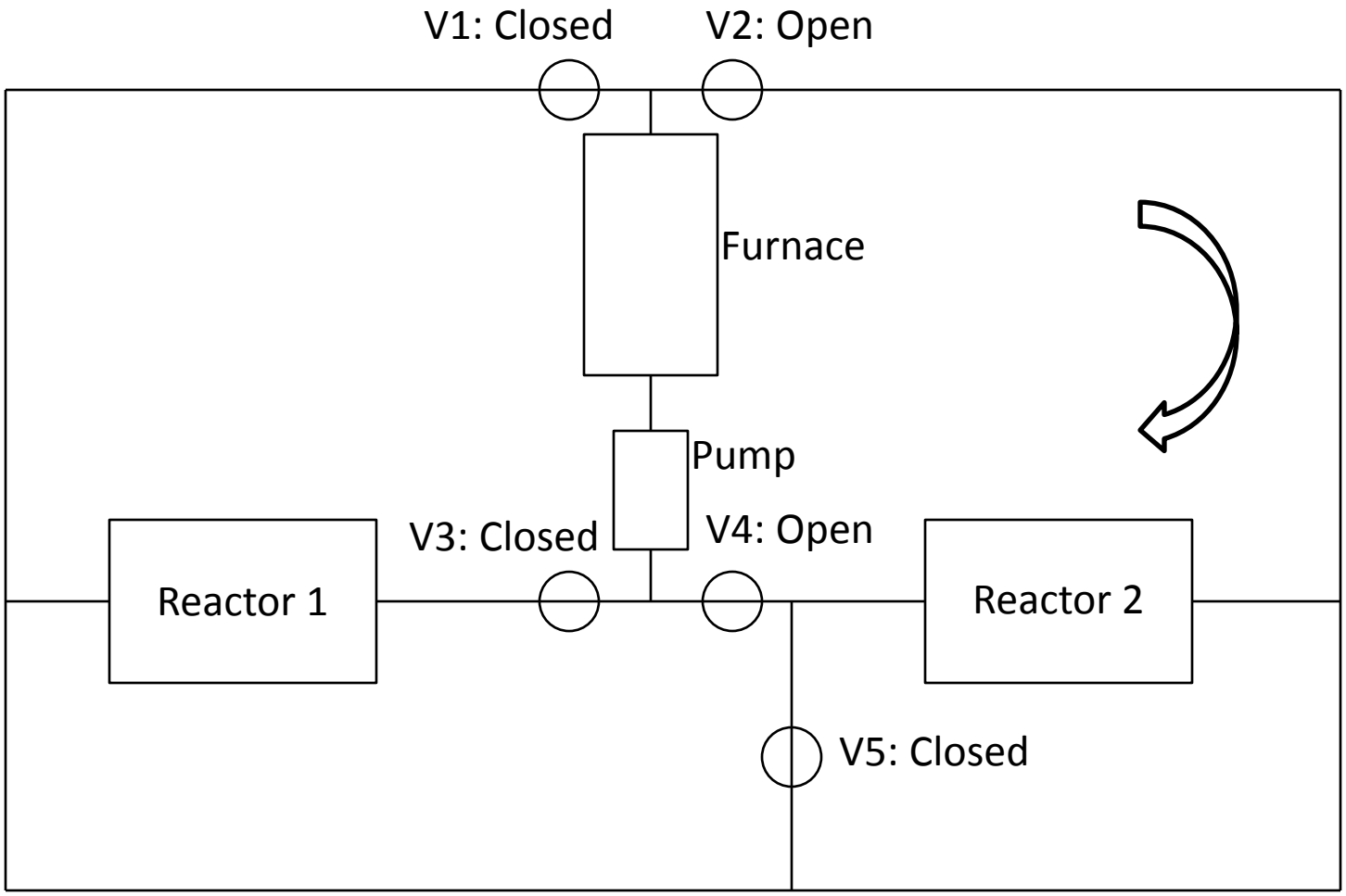
Step 1: Reactor 1 reduction

Thermochemical Reactor Prototype

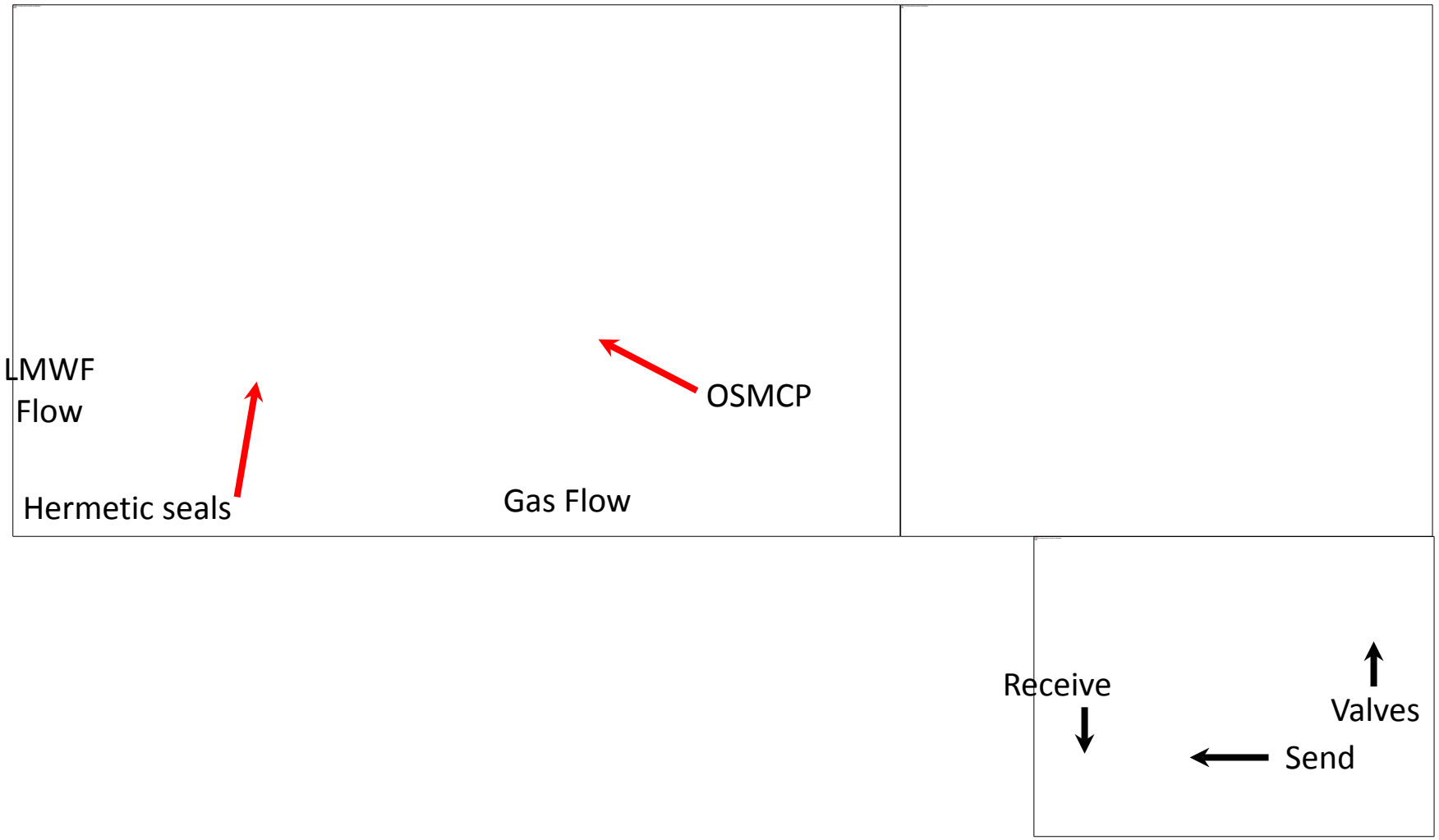


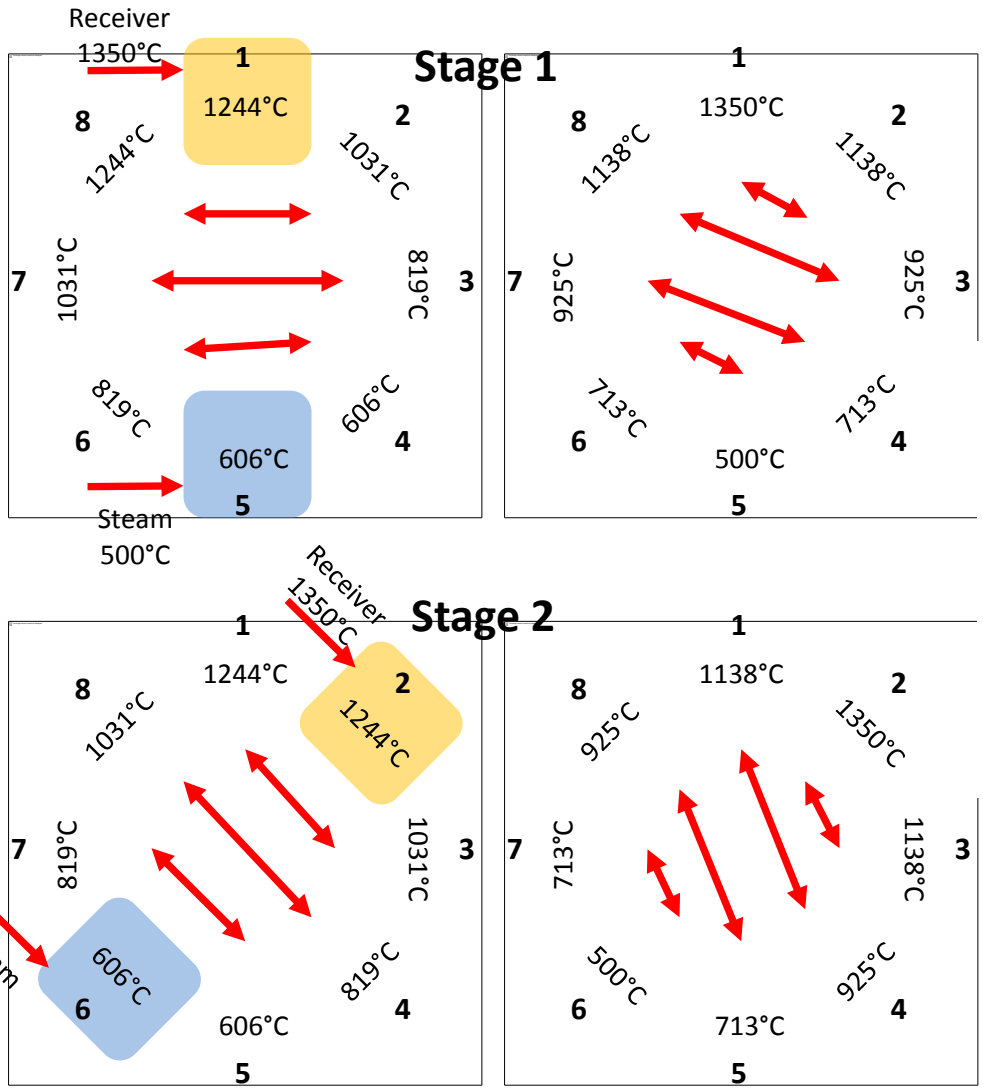
Step 2: Reactor 1-2 Recuperation

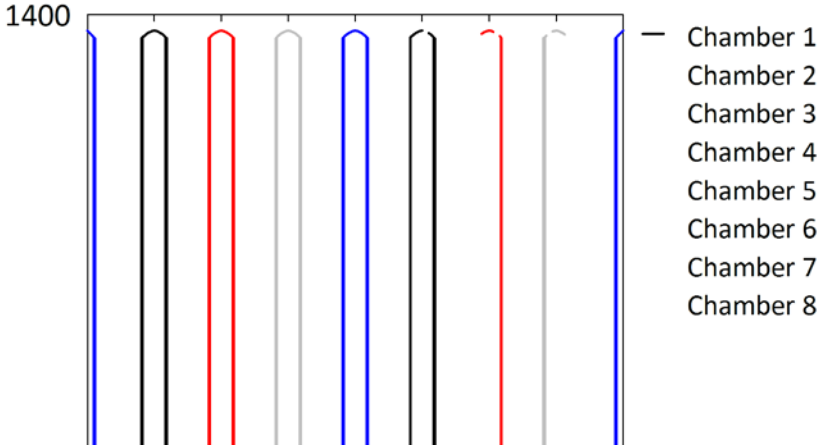
Thermochemical Reactor Prototype



Step 3: Reactor 2 Reduction


LMWF
Flow
Hermetic seals
Gas Flow
OSMCP
Receive
Valves
Send


Stage 1
Receiver
1350°C
1
1244°C
2
1031°C
3
819°C
4
606°C
5
606°C
6
819°C
7
1031°C
8
1244°C
1
1350°C
2
1138°C
3
925°C
4
713°C
5
500°C
6
713°C
7
925°C
8
1138°C
Steam
500°C
Stage 2
Receiver
1350°C
1
1244°C
2
1244°C
3
1031°C
4
819°C
5
606°C
6
606°C
7
819°C
8
1031°C
1
1138°C
2
1350°C
3
1138°C
4
925°C
5
713°C
6
500°C
7
713°C
8
925°C
Steam
500°C


1400
Chamber 1
Chamber 2
Chamber 3
Chamber 4
Chamber 5
Chamber 6
Chamber 7
Chamber 8