DE-EE0009377

1. Enhancing particle-to-sCO$_2$ heat exchanger effectiveness through novel high-porosity metallic foams Impact

Particle-to-sCO2 overall heat transfer coefficient (U_{HX}) enhancement is imperative to achieve DOE LCOE goals.

2. Project Goal

The goal is to enhance the heat transfer coefficient between the falling particle channel and the sCO$_2$ channel through incorporating Octet lattice structure on the falling particle channel side.

3. Method(s)

ASTM standard experiments to measure effective thermal conductivity of packed bed of particles and lattice structures. Control volume energy balance approach for measuring overall thermal transport with air and particles as "working fluids".

4. Outcome(s)

Successful validation of heat transfer coefficient and pressure drop across metal foams with existing literature within 10%. Our first hypothesis that effective thermal conductivity enhancement will have significant contribution to U_{HX}, received support due to the lattice presence.

5. Conclusion/Risks

Successfully tested packed bed of bauxite particles for effective thermal conductivity and demonstrated 4-10 times enhancement when Octet lattice was introduced. Next steps include characterization of flow through the Octet channels and particle flow through Octet channels.

6. Team

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Visuals

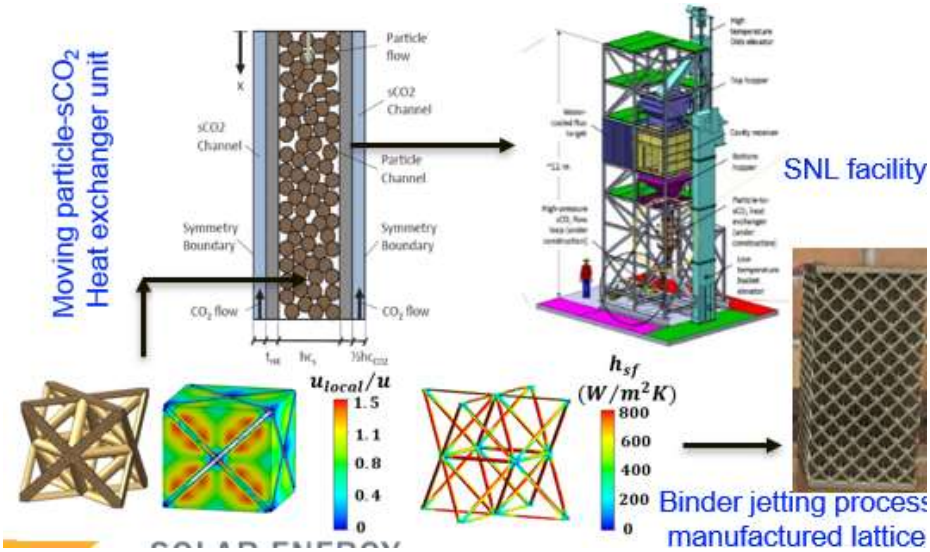

Figure 1. Project flowchart and representative results