



Advanced Lightweight Microclimate Cooling System

DESCRIPTION:

1998 Army S&T prototype utilizes efficient Rolling Piston compressor for lightweight vapor cycle refrigeration.

SPECIFICATIONS:

- 215 watts of body cooling provided by chilled water circulation through microclimate cooling tube undergarment.
- 4 hours operation on 2 BA5590
- Power: 100 watts @ 24 volt dc
- Cooler weight: 6.5 pounds
- Size: 4"x6"x11"





Individual Microclimate Cooling System (IMCS)

DESCRIPTION:

Engine driven refrigeration system that chills and circulates water to a tube garment to remove metabolic heat from the body.

SPECIFICATIONS:

- 300 watts of cooling
- Miniaturized internal combustion engine
- Backpack configuration 7"x10"x12"
- Fuel - JP8
- 5 hours of operation on 6 oz JP8 fuel
- System Weight: 17 pounds



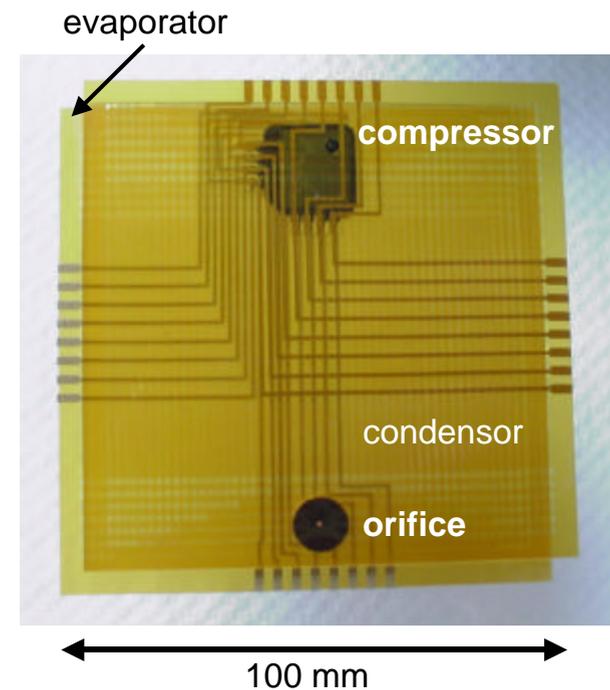


Integrated Mesoscopic Cooler Circuits (IMCC)

University of Illinois @ Urbana-Champaign

An complete vapor compression system on a chip

- Developed at University of Illinois under DARPA Mesoscopic Machines program
- IMCC incorporate a complete VC cycle on a thin flexible wafer 4"x4"x0.1"
- Provide 3 watts of cooling
- High efficiency predictions at COP: 3-6



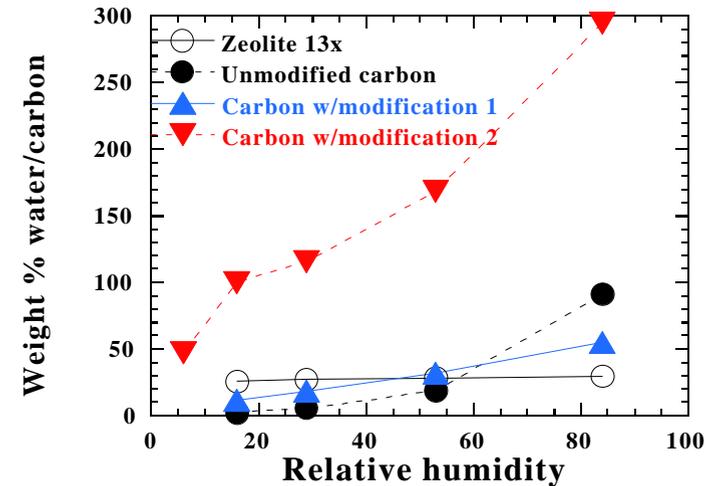
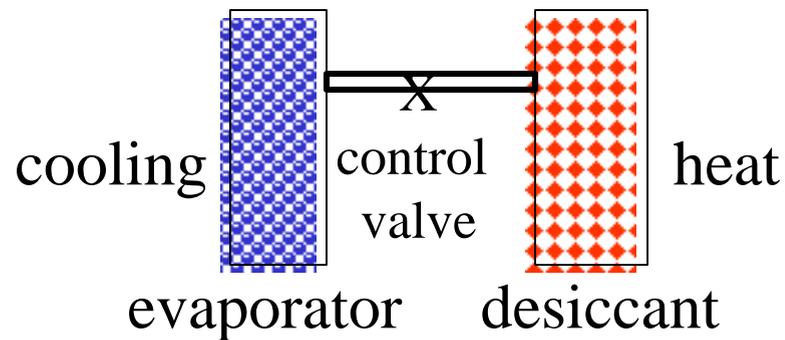


Absorption/Evaporative Cooling

NanoPore Inc., MesoSystems Technology Corp



- **Basic principle:** The heat of vaporization of water is 7x the heat of fusion. Evaporating water into a desiccant, cools the evaporator and heats the desiccant.



- **The problem:** Typical desiccants only adsorb about 20% of their weight in water. Therefore, the cooling density is on the same order as ice.
- **Advance:** New high water adsorption capacity desiccants



Objective Force Warrior MCC Concepts

Several options are being evaluated for the Objective Force Warrior cooling...including lightweight low power, miniature vapor compression coolers, air blowers and hybrid of both.

- Lightweight low power air blowers capable of delivering 8 to 15 CFM of ambient air to cool and dry the soldier's skin through evaporative cooling. The evaporative cooling potential varies depending on the ambient temperature and humidity and can provide up to 100 watts of cooling. Power for these blowers will range between 7 to 15 watts
- Miniature Vapor Compression Cooling system can deliver a rate of 100 watts of cooling in extreme hot environment they include
 - Advanced vapor compression cooling system (100 watts cooling rate at 50 watts power) by 2003
 - IMCC cooling system (100 watts cooling rate at 30 watts power) by 2006.