



21CR Project 612-10075

Model and Evaluation Tools for Assessing Magnetocaloric Effect for Space Conditioning and Refrigeration Applications

21 June 2005

Objective:

To develop modeling and evaluation tools to analytically determine the limits of efficiency for magnetic refrigeration based on material properties, operating conditions, parasitic losses, and realistic constraints on size and costs. Space conditioning and medium and low temperature refrigeration conditions will be included.

Information/items will result from this project:

Detailed tools and calculations, for given magnetocaloric materials, that estimate realistic operating efficiencies and peripheral energy consumption for Active Magnetic Regenerative (AMR) cooling in space conditioning, water chilling, and refrigeration applications at industry standard rating conditions.

How are the results likely to be applied:

The results of this project will provide information necessary for Industry researchers to understand and overcome one or more technical barriers limiting the development and application of AMR cooling techniques. These include, but are not limited to, the selection of heat transfer fluids and secondary loop design, selection of magnetocaloric materials, selection and design of magnets for relevant ΔT s, source and sink materials, and complex seal design problems. The information developed from the research will determine whether further research should be pursued for practical applications of this technology and the directions that any subsequent R&D should follow. The tools developed would also be useful to developers when materials with enhanced property relevant to those barriers become available.

Research Subcontractor:

University of Wisconsin - Madison, Madison, WI (Principal Investigator: Gregory Nellis, Ph.D.)

Status:

Project has been concluded and a final report approved for release. The final report is available free for downloading from the ARTI website.

Responsible 21CR Subcommittee: Emerging Technologies