Research Center for Next Generation Refrigerant Properties (NEXT-RP) I²CNER, Kyushu University

Background

As part of the efforts to reduce the use of ozone depleting substance, including specified CFCs and HCFCs, CFC alternatives, such as HFC refrigerant, have been produced. However, CFC alternatives have high global warming potential (GWP), which has led to concerns about their potential impact upon climate change. Some next-generation refrigerant mixtures, which are suitable for small scale air-conditioning equipment, have been suggested, but a decisive next-generation refrigerant has not been identified. In the future, identification of an optimized refrigerant will be essential not only for the development of refrigeration and air-conditioning industries, but also for the resolution of global environmental problems.

Research Divisions

(1) Division for Thermophysical Properties and Transfer Processes of Next Generation Refrigerants

Thermophysical properties (thermodynamic properties and transport properties) of next generation refrigerants are measured, and then based on these data, correlations and equations are formulated for use in the analysis of the transfer process.

(2) Division for Heat Pump and Refrigeration Cycles

In order to adapt next generation refrigerants to heat pumps and refrigeration instruments, the analysis of cycle performance is carried out, not only on pure refrigerants, but also on mixtures.

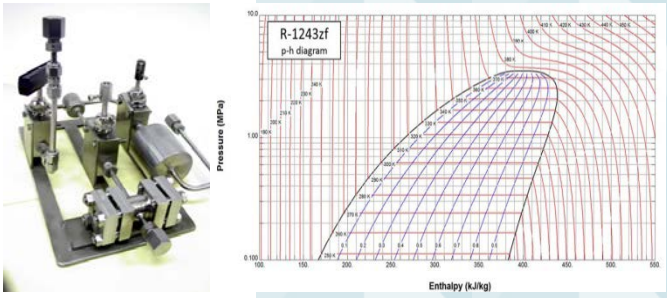
(3) Division for Refrigerant Property Information and Academia-Industry Collaboration

Information obtained from divisions 1 and 2 are compiled into a database, and the data are transferred using user-friendly software. The international collaboration is established amongst Japanese researchers and their collaborators at international universities and institutes.

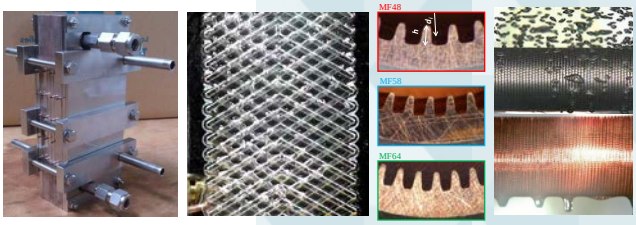
Scope and Objectives

- Accurate evaluation of thermophysical properties and fundamental performance of heat exchange and air-conditioning and refrigeration(ACR) cycles for zero-ODP and low-GWP refrigerants
- Organization of an R&D national research group led by Kyushu University
- Technology transfer to ACR industrial sectors

Equipment

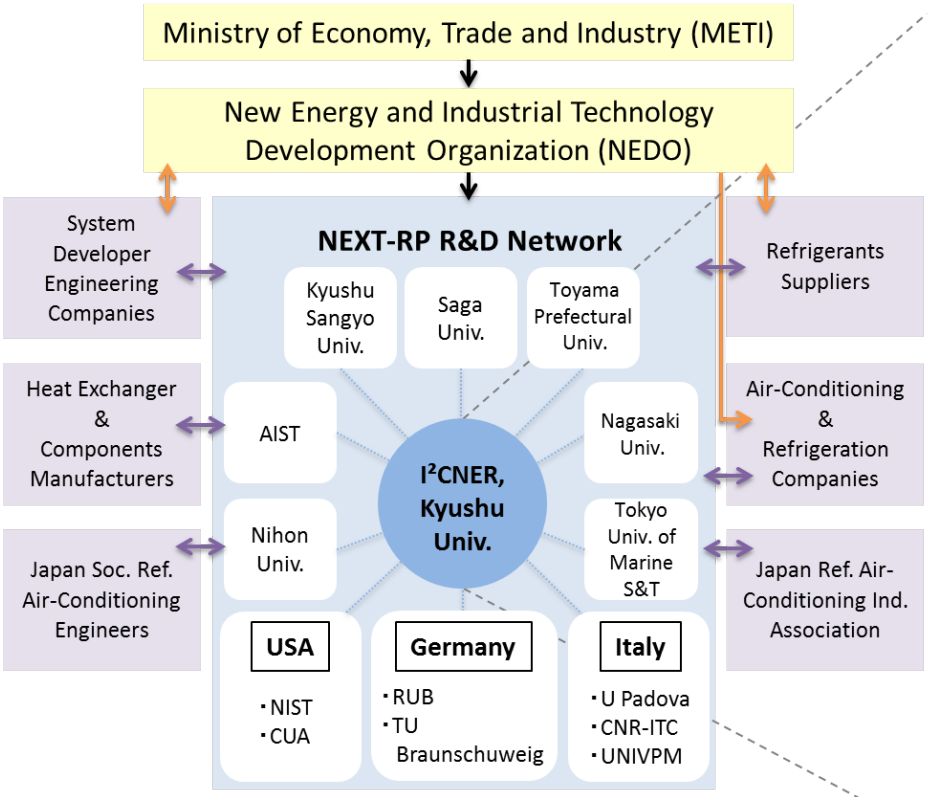


Thermodynamic measurements and development of the equation of state



Evaluation of heat transfer characteristics for various heat exchangers

Network of Collaborations and Organizational Structure



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Future Perspectives

New refrigerants for highly efficient vapor compression heat pump systems address will be excavated and investigated in order to solve serious energy problems and several environmental issues. Based upon the results of a previous NEDO project, R1123, R1225ye, and other new pure substances are expected. Possible mixtures will also be considered.

A worldwide network of collaboration will be maintained in order to exchange reliable thermophysical properties information. A reliable equation of state is necessary to fix the conditions of heat transfer experiments and to calculate the cycle performance. Of course, cooperation with I²CNER will be a priority, as well.

Contact us

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