

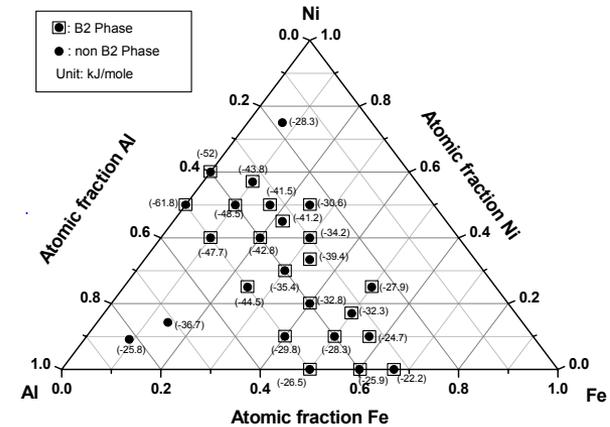
# Thermodynamic modeling of Al and Ni ternary alloy systems

Philip Nash, TPTC, Illinois Institute of Technology, **DMR-0209624**

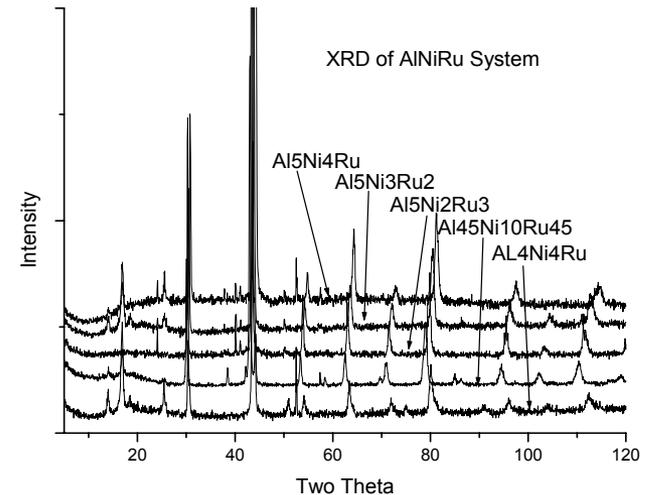
Alloys based on Ni and Al are of great practical importance and many intermetallic compounds may be found in ternary systems based on Al-Ni-X (X is transition metal)

In order to develop alloys with better properties, a thorough knowledge of phase equilibria and phase transformations is required. However, available experimental data is limited and time consuming to obtain, so thermodynamic modeling is used in order to determine phase equilibria and driving forces for transformations in an alloy system.

This project determines enthalpies of formation of intermetallic phases and phase relationships experimentally in Al-Ni-X systems, these data are then used to develop a thermodynamic database which can be used to develop new alloys with improved performance .



Enthalpies of Formation of Al-Ni-Y intermetallics



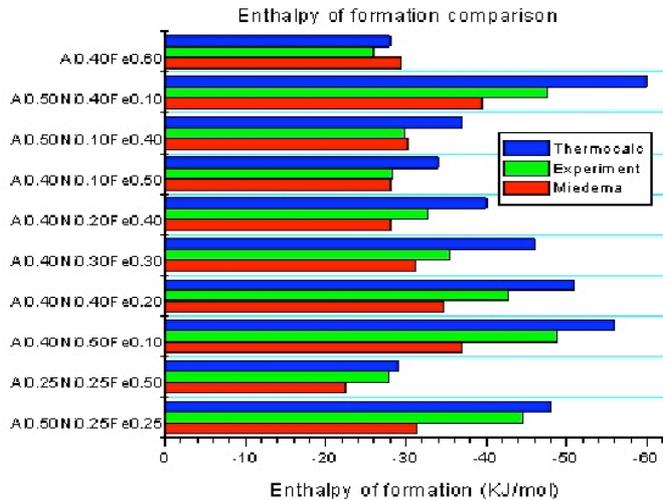
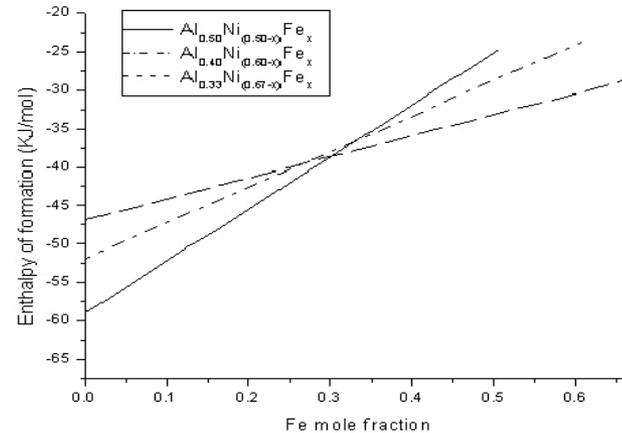
X-ray diffraction patterns of Al-Ni-Ru system

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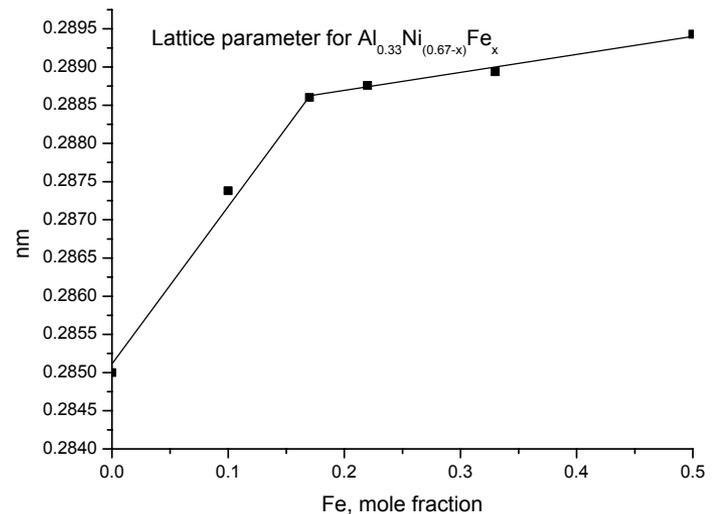
## Education:

Hsin-Ning Su is a Ph.D. student who is currently working on this project.



The comparison of Enthalpies of formation for Al-Ni-Fe system between Experimental, Miedema's and Thermocalc results.

## Enthalpy of formation of Al-Ni-Fe



Lattice parameter of Al<sub>0.33</sub>Ni<sub>(0.67-x)</sub>Fe<sub>x</sub>