Thermodynamics of the Oxide System ZrO_2 + Y_2O_3

Eric Lanero (Aerospace Engineering), Kaitlyn Wong (Mechanical Engineering)
Professor Luo

UC San Diego
JACOBS SCHOOL OF ENGINEERING

OBJECTIVE

Compare our resultant phase diagram using data from literature to the phase diagram created from our lab's data

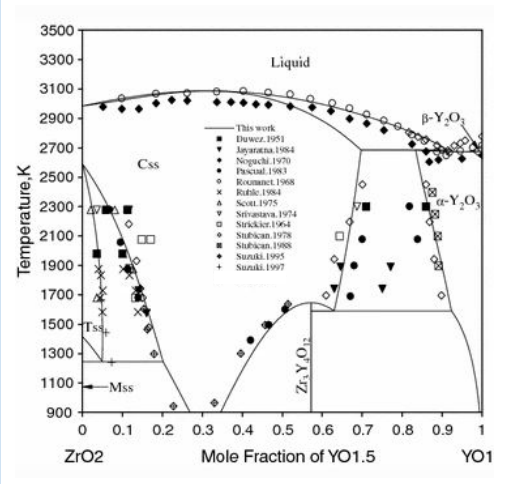
BACKGROUND & PROBLEM

- Demystifying fluorite oxide systems, focusing on the ZrO_2 + Y_2O_3 system
- Systems useful for nuclear waste and energy containment [1]
- Little work published → low confidence in how true results are
- If data and results match → can seek and test its applications

RESULTS & DISCUSSION

- Overall, phase diagrams from literature are consistent in their curves and shape
- Some minor variation in values
- Corroborated results from literature from various authors [2-5] and literature collected by Kun Wang, Chonghe Li, et al [1, 6-18]

OUR APPROACH



After performing our theoretical process, we created a phase diagram on Pandat that matches the work of our lab. We collected data from all existing research from scientific literature on the Yi2O3-Zr2O system, and combining their thermodynamic values to construct our own phase diagram, we see that our work is consistent [2-18]. With consistent results between the two groups, our lab's work is able to build confidence in the properties of these oxide systems, such as their higher heat tolerance.

FUTURE WORKS

- The data is consistent throughout the years → can begin to study its applications
- Research its usefulness and effectiveness as a material in engineering
- Compare its effectiveness to prior materials used
- See if adding other compounds would increase effectiveness

ACKNOWLEDGEMENTS

We would like to thank Dr. Luo, Dawei Zhang, and Mingde Qin for all their guidance and patience, the GEAR program for providing us this research opportunity, and Ved Vakharia for his support.

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Results:

- Collected data from all existing research from literature on the Yi2O3-Zr2O system
- Combined and corroborated thermodynamic values
- to construct our own phase diagram, we see that our work is consistent. With consistent results between the two groups, our lab's work is able to help create more confidence in the properties of these oxide systems, such as their higher heat tolerance.
- Discussion:
- The results match the work of our lab, which means that the phase diagram is correct, increasing the confidence in our lab's work. The results accomplished our goal of corroborating our lab's work on the Yi2O3-Zr2O system.

Conclusion:

- The relevance of our work is to try to make sure results are consistent so that information presented about oxide systems have certainty.
- Our methods included searching for literature analyzing our system and providing data that has the thermodynamic properties.
- Our main finding was that our work is consistent with what is found in literature.
- In the future, we will continue with our lab's research on oxide systems and continually assess its similarities and differences between other scientific literature
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