UNLV | UNIVERSITY LIBRARIES

Transmutation Sciences Materials (TRP) | Transmutation Research Program Projects

10-31-2002

Developing A Sensing System for the Measurement of Oxygen Concentration in Liquid Pb-Bi Eutectic: Quarterly Progress Report (Aug. 01 – Oct. 31, 2002)

Yingtao Jiang
University of Nevada, Las Vegas, yingtao@egr.unlv.edu

Bingmei Fu
bmfu@nscee.edu

Woosoon Yim
University of Nevada, Las Vegas, woosoon.yim@unlv.edu

Follow this and additional works at: https://digitalscholarship.unlv.edu/hrc_trp_sciences_materials

 Part of the Mechanical Engineering Commons, Nuclear Engineering Commons, and the Oil, Gas, and Energy Commons

Repository Citation

Jiang, Y., Fu, B., Yim, W. (2002). Developing A Sensing System for the Measurement of Oxygen Concentration in Liquid Pb-Bi Eutectic: Quarterly Progress Report (Aug. 01 – Oct. 31, 2002). 1-3.
Available at: https://digitalscholarship.unlv.edu/hrc_trp_sciences_materials/92

This Report is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Report in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Report has been accepted for inclusion in Transmutation Sciences Materials (TRP) by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

Quarterly Progress Report
(Aug. 01 – Oct. 31, 2002)

Developing A Sensing System for the Measurement of Oxygen Concentration in Liquid Pb-Bi Eutectic

Principle Investigators: Dr. Yingtao Jiang
Department of Electrical and Computer Engineering
UNLV
yingtao@egr.unlv.edu

Dr. Bingmei Fu
Department of Mechanical Engineering
UNLV
bmfu@nscee.edu

Dr. Woosoon Yim
Department of Mechanical Engineering
UNLV
wy@me.unlv.edu

Developing A Sensing System for the Measurement of Oxygen Concentration in Liquid Pb-Bi Eutectic

Introduction

After two month intensive work in LANL, some preliminary sensor calibration curves have been obtained. Further data analysis shall be performed to assess the theoretical and measured data. Also, a new experimental apparatus shall be designed and located in UNLV to continue the left work.

Personnel

Principal Investigators:

- Dr. Yingtao Jiang (Electrical and ComputerEngineering)
- Dr. Bingmei Fu and Dr. Woosoon Yim (Mechanical Engineering)

Students:

- Mr. Xiaolong Wu, Graduate Student, (Electrical and Computer Engineering)
- Mr. Ramkumar Bhavani Sivaraman (Electrical and Computer Engineering) (On a TA since September)

Note:

One graduate assistantship was offered to a student. Due to visa problem, he was unable to join our team.

Management Progress

- Expenditures incurred during this quarter are within the target amount allocated.

Management Problems

No problems have been encountered.

Technical Progress

- A set of calibration curves of voltage vs. temperature ranging from 300^0C to 500^0C under various oxygen concentrations in liquid LBE for the YSZ oxygen sensor has been obtained and has been reported in one paper.
- A meeting with LBE committee and other faculty members in AAA projects was organized to discuss our new experimental apparatus design.
- We have identified the major components/parts to be incorporated in our sensor experimental apparatus, and we have finalized the geometries of some of the parts. This newly-designed system shall be accommodated in HRC center.
- We started to use FEMLAB free version to do simulations for oxygen concentration distributions in our setup due to stirring.

Technical Difficulties

- Consistent memory overflow problems were encounter during FEMLAB simulations. The reason of these problems remains unknown and further study on this software thus is necessary.

Plans for the Next Quarter

- We need to consult Drs. N. Li and W. Hang to finalize the design of the new experimental apparatus. Modifications to our current design may be necessary after the scheduled meetings taking place on Nov. 8 and Nov. 25.
- In particular,
    - We need to contact Zircoa company about ordering and installation issues.
    - We need to continue to contact VWR to finalize the geometry of the stainless beaker.
    - In the end, we will make the decision in the geometry of the flange.
    - After selecting the stainless steel beaker, we can finalize the design of the heat jacket.
    - We will add a watch window into our design.
    - We will continue oxygen concentration simulations using FEMLAB
    - We will make final decision on the motor and shaft.
- Once the design is completed, we shall contact various vendors and manufacturers to order the parts.
- We will continue the oxygen concentration simulations using FEMLAB.