Annexure – VIII

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR : Dr T Lilly Shanker Rao
Dept of Electronics,
Narmada College

2. NAME AND ADDRESS OF THE INSTITUTION : Narmada College of Science and Commerce,Zadeshwar Bharuch 392011 (Gujarat)

3. UGC APPROVAL NO. AND DATE : No.47-718/08(WRO) dated 06/3/2009

4. DATE OF IMPLEMENTATION : 22/05/2009

5. TENURE OF THE PROJECT : 18 months

6. TOTAL GRANT ALLOCATED : Rs...85000/-

7. TOTAL GRANT RECEIVED : Rs 47500/-

8. FINAL EXPENDITURE : Rs.36262(Thirty six thousand two hundred and sixty two only)

9. TITLE OF THE PROJECT : Crystallization kinetics of magnetically soft metallic glasses

10. OBJECTIVES OF THE PROJECT:

(i) Structural analysis of Iron-based 2605SA1, 2605S3A and 2714A ribbons

(ii) Study of crystallization kinetics of these metallic glasses.

(iii) Determination of kinetic triplet through different methods to understand the thermal stability

11. WHETHER OBJECTIVES WERE ACHIEVED:

All the objectives of the project were achieved except the structural analysis of the samples because the temperature attachment for the XRD set up at Cochin (STIC) was under repair .

SUMMARY OF THE FINDINGS

1. DSC runs for three samples (Iron-based 2605SA1, 2605S3A and 2714A ribbons) were taken from CSMCRI Bhavnagar, SAIF Chennai and Applied Physics Department, MS University of Baroda Vadodara for different heating rates under non-isothermal conditions. This data were utilized to study the crystallization kinetics of these metallic glasses.
2. Kinetic triplet, [activation energy of crystallization (E),frequency factor(A), and Avrami exponent (n)] is determined to understand the thermal stability through different peak shift methods like (i) Kissinger,(ii)Ozawa (iii) Augis and Bennett (iv) Bosewell (v) Gao and Wang and (vi) Matusita and Sakka.
3. The data is also analyzed using different isoconversional methods like Kissinger-Akhira – Sunose (AKS) methods, Ozawa-Flynn–Wall (OFW) method, Friedman method, Vyazovkin method, Li - Tang method etc.
4. Kinetic triplet by isokinetic methods (model fitting methods) like Coats and Redfern method, Invariant Kinetic Parameter (IKP) method etc were also done.
5. The parameters like the activation energy of crystallization, E, frequency factor, A, and Avrami exponent,n, have been evaluated and reported using the various techniques classified as isokinetic and isoconversional.
6. A consistent data for E has been obtained through isoconversional methods, which is otherwise difficult to obtain from isokinetic methods.
7. The model-free isoconversional methods provide _ dependent activation energy values. The values derived using KAS and Ozawa–Flynn–Wall _OFW_ methods not only lie very close to each other, but also fall nearby the results of the non-linear isoconversional method proposed by Vyazovkin
8. Present study suggests that the model-free isoconversional methods are definitely superior to the iso-kinetic ones for the accurate determination of kinetic parameters like E and A. However, the knowledge of accurate E and A using thermal analysis, is not sufficient for the detailed investigations of the dimensionality of the growth and the grain size involved in the process of crystallization. Information from kinetic studies must be combined with information derived from a variety of other techniques to permit a meaningful description of events corresponding to the conversion of reactants [glass] to products [crystals].