

Isothermal deformation in the Bi_2O_3 – Sm_2O_3 eutectoid system

The Bi_2O_3 – Sm_2O_3 eutectoid system has been reported to exhibit transformational deformation associated with the eutectoid reaction [1]. This note reports on the isothermal deformation as a function of temperature for the reported eutectoid composition, 96 wt % Bi_2O_3 –4 wt % Sm_2O_3 [2].

Specimens were tested in compression at nine temperatures between 630 and 750°C including the reported transition temperature of 690°C. The creep behaviour proved to be restricted to the primary portion of the generalized creep curve, and, in the absence of clearly defined steady-state creep, the creep rate of 0.1 strain was used to

evaluate the deformation behaviour. The strain rate sensitivity index m , in the stress–strain rate relationship [3]

$$\sigma = K\dot{\epsilon}^m$$

where σ is the applied stress, $\dot{\epsilon}$ is the strain rate and K is a constant, was the parameter evaluated in this study. The m values were obtained from the slopes of plots of log stress versus log strain rate at each temperature. The results of this study are presented in Fig. 1. The strain rate sensitivity index is approximately 0.3 at both the low and high temperatures but increases as the temperatures approach the eutectoid transition. The data presented indicates that the deformation mechanism changes as the testing temperature approaches the eutectoid transition.

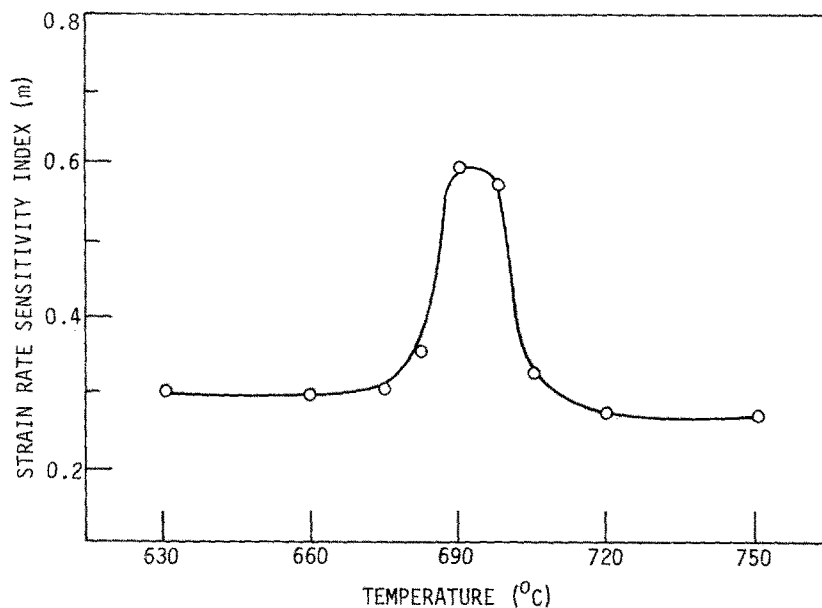


Figure 1 Strain rate sensitivity versus temperature for 96 mol% Bi_2O_3 –4 mol% Sm_2O_3 .

References

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