

CARE 2007-08 Scheme

Cascaded Dilatometer Facility

The *Cascaded Dilatometer Facility* will be housed at the Materials Processing Laboratory (MPL) in the Advanced Center for Materials Science.

A dilatometer is employed for measuring *in situ* the instantaneous dimensional changes in compacts during various thermal cycles. The dimensional changes are periodically recorded throughout the heating cycle as dilation (shrinkage/swelling) allowing calculation of dilation rate. Dilatometry provides insight into a wide range of phenomena, such as densification, rearrangement, compact dimensional stability, crystallization kinetics, etc. A comprehensive knowledge of these effects aids in devising proper processing pathways for materials. Dilatometer is a powerful tool for understanding and optimizing thermal cycle. The proposed unit allows for determination and quantification of the response of thermal treatment on the dimensional change in materials. The unit consists of cascaded furnace (twin configuration) with capability to go up to 1400°C (SiC heating elements) and 1650°C (superkanthal element). The proposed configuration is capable of continuously monitoring the change in length in a range of materials under various atmospheres [flowing hydrogen, nitrogen, argon and vacuum (10^{-3} mm Hg)]. The unit is fully programmable and can measure thermal expansion coefficient; expansion/shrinkage rate, phase transformation, and melt formation; and activation energy.