

## Residual stress behavior of polyimide containing negative thermal expansion material $ZrMo_2O_8$

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polyimide composites containing negative thermal expansion material is synthesized from 4,4'-oxydianiline (ODA), 1,2,4,5-benzenetetracarboxylic dianhydride (PMDA) and zirconium molybdate. The negative thermal expansion material cubic  $ZrMo_2O_8$  is prepared by the carefully controlled dehydration of  $ZrMo_2O_7(OH)_2 \cdot 2H_2O$ . The residual stress behavior during imidization up to 400°C and its relaxation behavior were measured in situ using thin film stress measurement system (TFSMS). Measured CTE value of  $ZrMo_2O_8$ /PMDA-ODA hybrid film containing 0~25 wt% ceramic loading show a reduction in thermal expansion with increasing ceramic content. Consequently, thermal stress of the film was reduced with increasing ceramic content.