



## **An Insight Into Cyclic Oxidation behavior of ZrB<sub>2</sub>-20 Vol.% MoSi<sub>2</sub> Based Ultrahigh Temperature Ceramic Matrix Composite**

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# **An Insight Into Cyclic Oxidation behavior of ZrB<sub>2</sub>-20 vol.% MoSi<sub>2</sub> Based Ultrahigh Temperature Ceramic Matrix Composite**

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## **Abstract**

In the context of hypersonic re-entry nosecones, subjected to repeated thermal shocks while descending through different layers of the atmosphere, with tremendously high velocities, it becomes extremely important to investigate the cyclic oxidation behavior of ultra-high temperature ceramics. The present study focuses on the cyclic oxidation law obeyed by ZrB<sub>2</sub>-20 vol.% MoSi<sub>2</sub> composite during oxidation at temperatures ranging from 1100°C to 1300°C by carrying out six cycles for 6 h, at every individual temperature. The oxidation kinetic law has been estimated by measuring weight change at different times for each temperature. The curves plotted between weight gain per unit area and exposure time (in second) having the R<sup>2</sup> (goodness of fit) values more than 0.9 are considered to be the accurate fit curves for defining correct oxidation law. Cyclic oxidation of ZrB<sub>2</sub>-MoSi<sub>2</sub> composite follows linear rate law up to 1250°C, and for 1300°C, it follows parabolic rate law, which is diffusion-controlled process. Furthermore, XRD of the oxide layers has also been performed to analyze the scale formed, and scanning electron microscopy-energy dispersive spectroscopy of the oxide layer has also been performed to determine its thickness and its precise chemical composition in order to characterize the oxide layer.

Keywords: Ultra-high temperature ceramic matrix composites, oxidation kinetics, X-RayDiffraction, Scanning Electron Microscopy.

## **Reference**

Saha M, Pramanik S, Banik R, Maurya P, Singh S, Raj SV, Madhur DP, Paul TR, Mitra R, Mondal MK, Mallik M. An Insight Into Cyclic Oxidation behavior of ZrB<sub>2</sub>-20 Vol.% MoSi<sub>2</sub> Based Ultrahigh Temperature Ceramic Matrix Composite. InModern Manufacturing Systems 2022 Dec 27 (pp. 149-163). Apple Academic Press.