

Evaluation of high heating rates in FAST/SPS of WC/Ti powders

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Field Assisted Sintering Technology/Spark Plasma Sintering (FAST/SPS) is considered one of the most efficient powder consolidation techniques, enabling the production of dense materials in very short processing times. Among the key process parameters, the heating rate plays an important role, as it affects both densification kinetics and microstructural evolution. Although FAST/SPS devices can in principle reach extremely high heating rates, their practical use is limited by several technological factors. Tool dimensions and geometry strongly influence energy transfer efficiency and therefore the maximum achievable heating rate. Increasing the heating rate also raises the risk of significant thermal gradients, especially in large or complex-shaped sintered compacts, which may lead to inhomogeneous densification, microstructural variations, and reduced performance of the final component. Additionally, local overheating of graphite tooling under extreme conditions can compromise process stability and tool lifetime. This work examines both the advantages, such as shorter processing times and potential microstructure refinement of WC/Ti systems, and the limitations associated with pushing heating rates to their extremes, offering insights that support more reliable and optimized FAST/SPS process design.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

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No

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