

PROCEEDINGS

# Research on the Fabrication and Properties of Si<sub>3</sub>N<sub>4</sub> Ceramic Radomes via Vat Photopolymerization (VPP)

Jiamin Wu<sup>1,2,3,\*</sup>, Zhicong Luo<sup>1,2</sup>, Fulin Zhou<sup>1,2</sup>, Qiwen Wang<sup>1,2</sup>, Weikang Li<sup>1,2</sup>, Weihao Cai<sup>1,2</sup>, Sen Su<sup>1,2</sup>, Lin Guo<sup>1,2</sup>, Chunsheng Ye<sup>1,2</sup> and Yusheng Shi<sup>1,2</sup>

<sup>1</sup>State Key Laboratory of Materials Processing and Die & Mould Technology, School of Materials Science and Engineering, Huazhong University of Science and Technology, Wuhan, 430074, China

<sup>2</sup>Engineering Research Center of Ceramic Materials for Additive Manufacturing, Ministry of Education, Wuhan, 430074, China

<sup>3</sup>Wenzhou Key Laboratory of Microwave Communication Materials and Devices, Wenzhou Advanced Manufacturing Institute of HUST, Wenzhou, 325035, China

\*Corresponding Author: Jiamin Wu. Email: jiaminwu@hust.edu.cn

## ABSTRACT

Silicon nitride (Si<sub>3</sub>N<sub>4</sub>) ceramics with outstanding comprehensive properties, have become important candidate materials for components like radomes and antenna windows. In this study, the vat photopolymerization (VPP) technique was used to fabricate Si<sub>3</sub>N<sub>4</sub> ceramic radomes. Our research centered on optimizing the curing properties of ceramic slurries and precisely regulating the comprehensive properties of the ceramics. Several methods were proposed to modify the curing depth of Si<sub>3</sub>N<sub>4</sub> ceramic slurry, including thermosetting resin coating, sintering aid coating, oxidation coating, double coating, etc. Moreover, a pore-forming agent modification method was also proposed, which enabled the VPP printing of Si<sub>3</sub>N<sub>4</sub> ceramic parts with well-controlled pore structure. Subsequently, the correlations among process parameters, microstructure, and the properties of Si<sub>3</sub>N<sub>4</sub> ceramics were successfully established. This research intended to offer a valuable reference for the further research and application of Si<sub>3</sub>N<sub>4</sub> ceramics in the radome field.

## KEYWORDS

Vat photopolymerization (VPP); silicon nitride (Si<sub>3</sub>N<sub>4</sub>); coating modification; ceramic radomes

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