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## Flash sintering of sodium niobate ceramics

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**Abstract:** Dense and stoichiometric  $\text{NaNbO}_3$  ceramics were difficult to be prepared by conventional sintering methods because  $\text{Na}_2\text{O}$  easily volatilized at elevated temperature. In this work, the volatility of  $\text{Na}_2\text{O}$  was suppressed by applying an electrical field assisted sintering method. Flash sintering was performed successfully on  $\text{NaNbO}_3$  ceramics under the electrical fields ranging from 400 to 700 V/cm. The Na/Nb ratio of dense ceramic remained similar to that of the green sample. Our work demonstrated that flash sintering was an alternative technique for fabricating dense and high-purity ceramics with highly volatile species.

**Keywords:** Sintering; Sodium niobate; Ceramics; Stoichiometric; Rapid densification.

### 1. Introduction

Piezoelectric ceramics are important and extensively used materials in many fields. The dominating piezoelectric ceramics are mostly lead-based ceramics. For the sake of the environmental protection and human health, lead-free piezoelectric ceramics need to be developed. Sodium niobate and its alkaline niobates solid solutions are important lead-free family with piezoelectric property [1]. The dense and stoichiometric  $\text{NaNbO}_3$  ceramics are difficult to be fabricated because  $\text{Na}_2\text{O}$  easily

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