

**Internal stress and dislocation-mediated phase structure and conduction
mechanism in flash-sintered $\text{Na}_{1/2}\text{Bi}_{1/2}\text{TiO}_3$ -based ceramics**

Pengrong Ren^{1, *#} Shuai Zhang^{1, #} Yang Su^{2, #} Huimin Guo³, Wenjing Qiao¹,

Dianguang Liu^{3, †} Chen Shen^{4, ‡} Fangping Zhuo⁴, Till Frömling⁴

¹ Shaanxi Province Key Laboratory for Electrical Materials and Infiltration
Technology, School of Materials Science and Engineering, Xi'an University of
Technology, Xi'an, 710048, P. R. China

² State Key Laboratory of High Pressure and Superhard Materials, International
Center of Computational Method and Software, College of Physics, Jilin University,
Changchun 130012, P. R. China

³ School of Materials Science and Engineering, Southwest Jiaotong University,
Chengdu, 611031, P. R. China

⁴ Department of Materials and Earth Sciences, Technical University of Darmstadt,
64287 Darmstadt, Germany

[#] P. Ren, S. Zhang, and Y. Su have made the equal contributions to this work.

^{*} Corresponding author, E-mail: renpengrongxaut@126.com

[†] Corresponding author, E-mail: dianguang@swjtu.edu.cn

[‡] Corresponding author, E-mail: chenshen@tmm.tu-darmstadt.de

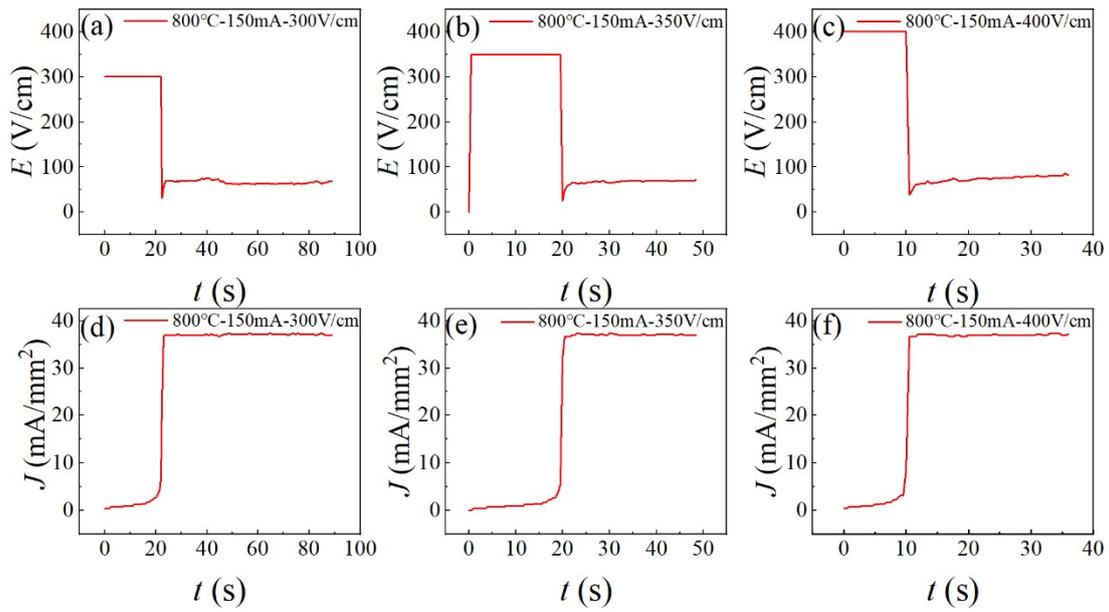


Fig. S1 The electric field and current density during flash sintering: (a, b) 300 V/cm; (c, d) 350 V/cm; (e, f) 400 V/cm. The current is limited to 150 mA.

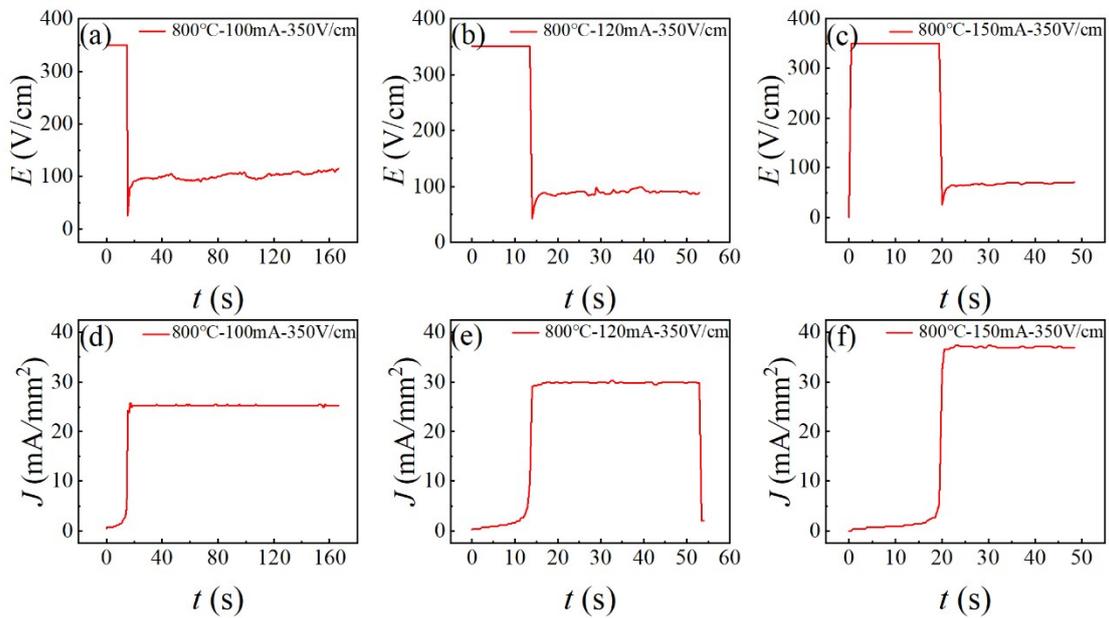


Fig. S2 The electric field and current density during flash sintering: (a, b) 100 mA; (c, d) 120 mA; (e, f) 150 mA. The electric field is limited to 350 V/cm.

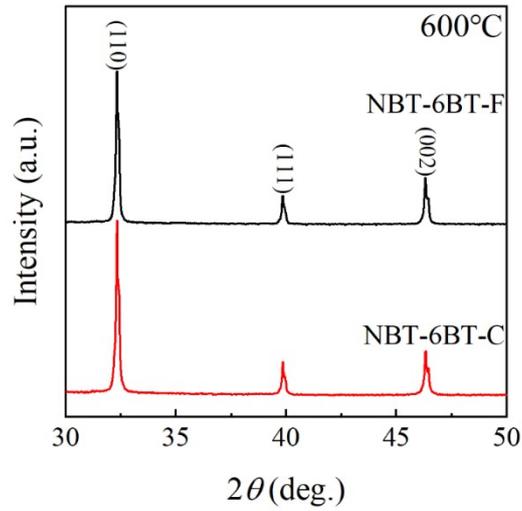


Fig. S3 XRD patterns of NBT-6BT-F and NBT-6BT-F measured and 600 °C.

Table S1 The geometry information, relative density and d_{33} of samples prepared by flash sintering under different conditions.

Sample	Effective Length (mm)	Width (mm)	Height (mm)	Temperature (°C)	Electric Field (V/cm)	Current (mA)	Relative density (%)	d_{33} (pC/N)
S1	18.5	3	1.4	800	300	150	97	103
S2	18.2	3	1.4	800	400	150	96	46
S3	18.4	3	1.4	800	350	100	98	16
S4	17.9	3	1.4	800	350	120	91	111
S5	18.1	3	1.4	800	350	150	97	103