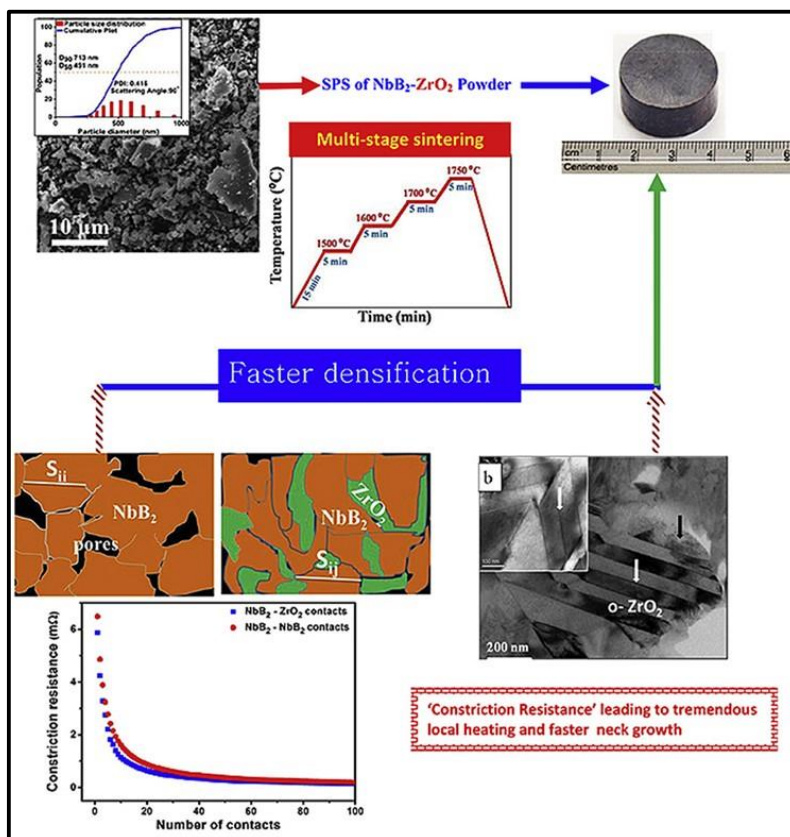


T. N. Maity, Krishanu Biswas, and Bikramjit Basu, [Critical role of ZrO<sub>2</sub> on densification and microstructure development in spark plasma sintered NbB<sub>2</sub>](#); **Acta Materialia** 152 (2018) 215-228.

### Graphical Summary:



### Significance/Impact

The densification of many of the transition metal borides, like niobium diboride (NbB<sub>2</sub>) presents significant challenges for ceramicists. This work demonstrated that NbB<sub>2</sub> could be consolidated using four-stage spark plasma sintering with final holding at 1750°C for 2 min, with ZrO<sub>2</sub> as sinter-aid. The microstructure contains a dispersion of t-ZrO<sub>2</sub> or o-ZrO<sub>2</sub>, and the defect structure including edge dislocations and asymmetric twins in o-ZrO<sub>2</sub>. The densification and microstructure development were analyzed in terms of quantitative analysis of 'constriction resistance' induced localized heating and defect structure. This work established that a combination of high hardness (~22 GPa) together with moderate indentation toughness (~5.2 MPa m<sup>1/2</sup>) can be achieved with solid-state sintered NbB<sub>2</sub> containing ZrO<sub>2</sub>.