

Strong Electric Field/Current Effects on High Temperature processes in Zirconia (8YSZ) Polycrystal

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Flash sintering, which occurs under strong electric fields larger than a critical value, has been known to successfully lower the sintering temperature and time of ceramic powder compacts. The flash event is known to work not only on the sintering of ceramic powders, but also on high temperature behavior of bulk ceramics, such as deformation and joining. Currently, it has been confirmed that the flash event is also effective to accelerate crack healing. For example, although the crack healing occurs even under the static annealing without the electric field (0V), the rate of the crack healing was 180 times faster than that of the static annealing (0V) and complete the crack healing at 1230 °C for 10 min. Under the flash event, the crack healing behavior is apparently accelerated in fine grained 8Y-CSZ than in coarse grained one, suggesting that the grain boundaries play an important role in the flash event. The enhanced processing cannot be explained only by the thermal effect caused by Joule heating, but by non-thermal effects caused additionally by the flash event. Especially, the flash healing behavior under the flash event would be accelerated through the field/current-enhanced diffusional processes, especially through the grain boundary diffusivity of the cations.

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Professional Status of the Speaker

Senior Scientist

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Invitation letter for visa

No

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