

Optimized preferential grain orientation of sodium ion conductive ceramics

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Summary

Na β -alumina is a two-dimensional ionic conductor in which conducting planes of Na⁺ ion are separated by insulating spinel block layers. For practical use, Na β -alumina needs not only high ionic conductivity but also mechanical reliability. Therefore, we prepared preferentially oriented Na β -alumina ceramics by hot pressing and evaluated the ionic conductivity and mechanical strength. The ionic conductivity perpendicular to the c-axis-oriented plane was five times higher than that parallel to c-axis. From the preferentially oriented Na β -alumina ceramics three types of test pieces were cut for a three-point bending test. In one type of test piece, the longest side was parallel to the hot pressing direction, while the longest sides were perpendicular to that direction in the other types of test pieces. The latter test pieces showed mechanical strength 1.5 times that of the former.