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Anisotropic properties of highly textured porous alumina formed from platelets

Sawao Honda, Shinobu Hashimoto, Syuya Iwata, Yuji Iwamoto Nagoya Institute of Technology, Department of Environmental and Materials Engineering, Gokiso-cho, Showa-ku, Nagoya 466-8555, JAPAN **Keywords**: platelets, porous alumina, thermal conductivity, bending strength, orientation

Abstract

Alumina platelets and a pulsed electric current sintering (PECS) technique were used to form porous alumina with highly oriented grains in one direction. A slurry consisting of alumina platelets, distilled water, and organic binders was spread over a gypsum board to form a green sheet. Pellets 14 mm in diameter were punched from the sheet and preheated at 800°C to burn off the binders. The preheated pellets were placed in a carbon die, which was then positioned within the PECS device. After heating at 1400°C and 30 MPa for 5 min, porous alumina with 80.8% density was obtained. Parallel to the pressing direction, the thermal conductivity and bending strength of the porous body were 22.4 W·m⁻¹·K⁻¹ and 404 MPa, respectively. Perpendicular to the pressing direction, on the other hand, the thermal conductivity and bending strength of the porous body were 10.8 W·m⁻¹·K⁻¹ and 217 MPa, respectively.

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