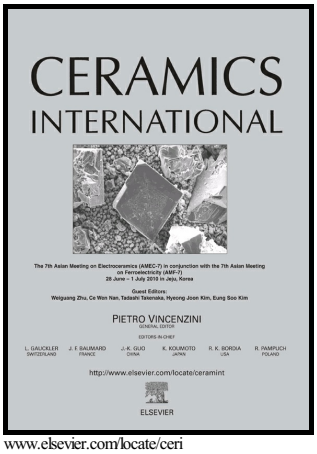

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Enhancing copper infiltration into alumina using spark plasma sintering to achieve high performance Al_2O_3/Cu composites

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Abstract: Al_2O_3/Cu (with 30 wt% of Cu) composites were prepared using a combined liquid infiltration and spark plasma sintering (SPS) method using pre-processed composite powders. Crystalline structures, morphology and physical/mechanical properties of the sintered composites were studied and compared with those obtained from similar composites prepared using a standard liquid infiltration process without any external pressure. Results showed that densities of the Al_2O_3/Cu composites prepared without applying pressure were quite low. Whereas the composites sintered using the SPS (with a high pressure during sintering in 10 minutes) showed dense structures, and Cu phases were homogenously infiltrated and dispersed with a network from inside the Al_2O_3 skeleton structures. Fracture toughness of Al_2O_3/Cu composites prepared without using external pressure (with a sintering time of 1.5 hours) was 4.2 MPa·$m^{1/2}$, whereas that using the SPS process was 6.5 MPa·$m^{1/2}$.