

PRECISION MICROGEAR BURNOUT AND FIRING WITH MICROWAVES

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Micro-electro-mechanical-systems (MEMS) require high precision microcomponents. Alumina and zirconia toughened alumina microgears were fabricated by precision mold and epoxy-casting ceramic powders. The 3 mm diameter, 40 μ m thick components have details on the order of 20 μ m. The components underwent a one step microwave debinding and sintering process. The gears were held flat between zirconia discs and microwave processed to temperatures between 1300 and 1550 °C in less than 1 hour. Microstructure and the uniformity of shrinkage were observed by SEM and compared to conventionally fired gears. Components from identical processing and microwave sintering environments showed radically different grain structure, which may be caused by the shape of the component.