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**Parameters and sinterability of mullite-ZrO<sub>2</sub>(Y<sub>2</sub>O<sub>3</sub>) nanoparticles prepared by plasma and chemical methods**

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Mullite-ZrO<sub>2</sub>(Y<sub>2</sub>O<sub>3</sub>) spherical nanoparticles with diameter in the range of 40-65 nm, containing t-, m-ZrO<sub>2</sub> phases and traces of mullite were prepared by using thermal plasma.

Combustion synthesis from appropriate salts water solution was performed in the presence of glycine at 500 °C during 2 h and additional calcination at 950 °C. The obtained powder contained mullite and t-ZrO<sub>2</sub> phases with crystallite size of 25 and 15 nm respectively.

Molten salts synthesis at 850-900 °C for 2 h allowed obtain crystalline mullite and t-ZrO<sub>2</sub> nanoparticles with crystallite size of 60 nm, 55 nm respectively.

The parameters of prepared nanoparticles and sinterability using spark plasma sintering were compared. The powders produced by plasma chemical synthesis showed higher sinterability. They allowed prepare fine-grained (0.8-1.4 μm) dense materials (99.1%) at 1400 °C during 3 min.

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