INFLUENCE DISPERSION THE RAW POWDER ON THE PROPERTIES OF SPS-CERAMICS

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In previous studies [1, 2] it is shown that there is a fundamental possibility of a full cycle of the ceramic with submicrostructure by consolidating product plasmodynamic synthesis. Dispersed and phase characteristics of the base product [3-5] have a significant impact on the physical and mechanical properties of the sintered ceramics. Dispersing the product was necessary to prevent the formation during sintering of focal defects.

SPS-consolidation of powder samples before and after activation was conducted under the same parameters of SPS: V_T = 850°C/min, T = 1300°C, P = 80 MPa without holding at a constant temperature.

Increased bulk density and the effect produced by them is very clearly visible when comparing the curves punches move during the time of sintering. Moving the movable punch experiment unactivated powder was 3.5 mm, while the activation of the powder allowed to reach a displacement of 1.75 mm under otherwise equal conditions.

As seen in Figure 1, the use of the product activation on a planetary mill allowed to exclude focal defects and achieve a strict uniform structure.

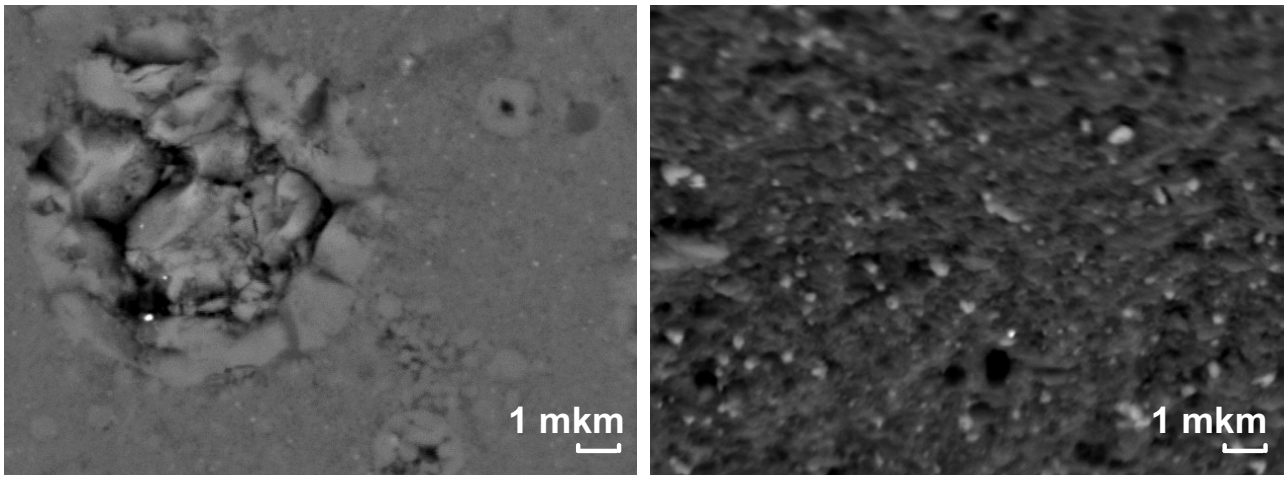

Figure 1. SEM-pictures chipped ceramic samples obtained from powder samples before and after the deagglomeration in the planetary mill.

The hardness of the materials obtained as measured by the Vickers indenter method of reduced imprint was 21 GPa for non-activated powder and 17 GPa for activated when the relative density of sintered ceramic blanks with respect to the single crystal osbornita 92% and 93.5%, respectively. A significant increase in the density of the sintered body is mainly due to the elimination of agglomeration raw product.

On the SEM-images show small enough porosity of the material. Shows a SEM-picture of a small number of pores in the material of the maximum size of not more than 300 nm, the average grain size of 100 nm. Decrease in the microhardness of the sintered samples similarly can be explained by the phases of iron in the sintered sample.

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