

Sintered glass-ceramic from iron-rich MSWA

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Iron-rich Municipal Solid Waste Bottom Ash (MSWA) was “as it is” vitrified and water quenched. The obtained glass frit was milled, pressed and sintered in air and inert atmospheres to produce low-cost glass-ceramic. The sintering behavior was estimated with optical dilatometry, the phase formation was studied by DTA and XRD and the microstructure of final samples was observed by SEM.

It was demonstrated that the parent glass is characterized with a high crystallization trend, which inhibits the densification at low temperature. However, after increasing the sintering temperature near to the eutectic temperature (1100-1130 °C) rapid secondary densification process re-starts, which for short time leads to material with zero water absorption, low closed porosity and high crystallinity.

It was also highlighted that the ratio between formed crystal phases (i.e. pyroxene solid solutions and melilite solid solutions) strongly depends on used atmosphere. In addition, in inert atmosphere the sintering temperature decreases due to lower viscosity, as well as supplementary nucleation process carries out, which leads to finer crystalline structure.