

# **Densification of Ceramics by Cold Sintering and Its Applications**

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Reducing the sintering temperature of ceramics has been a challenge for decades. Because sintering of ceramics at high temperatures has undesirable side effects on the microstructure, which are abnormal grain growth, evaporation of volatile chemicals, phase separation, and waste of energy, etc, putting the cost of expensive equipment and long processing time aside. To prevent the mentioned side effects of high temperature sintering, researchers assisted sintering with liquid phase, chemical reaction, pressure, electrical field, or their combinations. Despite the fact that utilization of these techniques has brought significant advances in lowering the sintering temperature, there always have been attempts to find novel and simple ones. It turns out that cold sintering is one of them that either densifies the ceramic at temperatures either  $<300^{\circ}\text{C}$  or significantly reduces the sintering temperature well below the conventional sintering temperature with the utilization of nano ceramic powders.