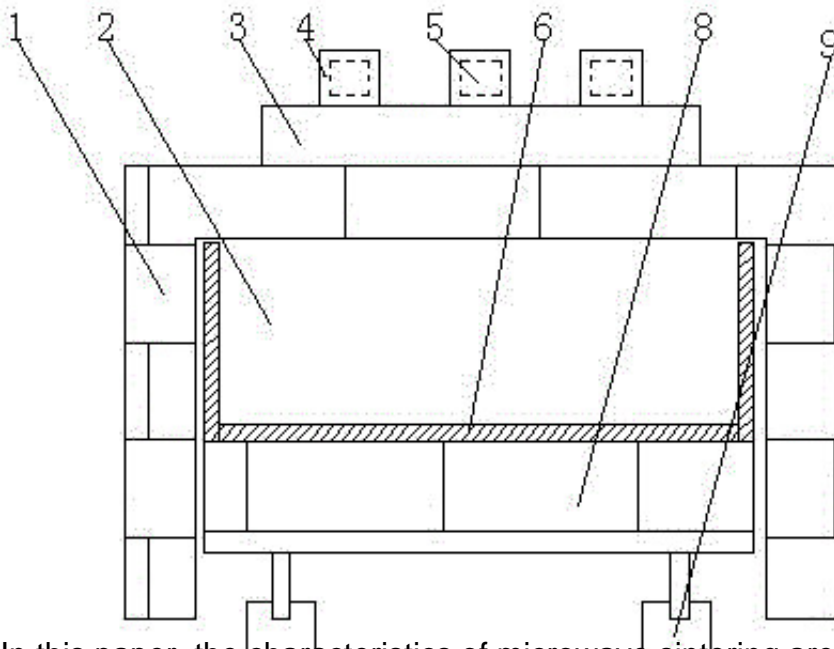


Microwave High Temperature Heating System and Microwave Sintering of Typical Ceramics

Microwave heating is a heating method by which microwave penetrates into the material and warms its volume. Therefore, microwave heating has the characteristics of rapid heating and uniform temperature distribution.

[Microwave high temperature sintering equipment](#)

When microwave heating is applied to ceramic sintering, compared with conventional sintering methods using electric furnace, gas furnace and oil-fired furnace, its sintering time is greatly shortened, energy consumption can be reduced by 70-90%, and microwave sintering is also superior to conventional sintering in ceramic properties. [Microwave sterilization machinery and equipment](#)



In this paper, the characteristics of microwave sintering are systematically discussed, and corresponding improvement schemes are put forward in view of the existing problems in microwave sintering technology of ceramics. In view of the shortcomings of similar microwave sintering furnaces at home and abroad, a microwave sintering furnace with power of 2.7KW, frequency of 2.45GHz, effective size of heating chamber of 500 *500 (mm) and multi-mode field or complementary field in the cavity was designed and manufactured by the author. By optimizing the design of microwave generator and thermal insulation structure, not only good sintering effect is achieved, the scope of application is expanded, but also the manufacturing cost is reduced.

The sintering furnace can complete atmospheric sintering. Its maximum sintering temperature can reach 1700C, and it also has the ability to continue heating. At the same time, some design criteria of small microwave sintering furnace are given, which lays a foundation for the design and development of large industrial microwave high temperature sintering equipment with

energy saving, high efficiency and convenience. The microwave sintering of SiC ceramics with high dielectric loss can be accomplished in this furnace, and the microwave sintering of Al₂O₃ ceramics with low dielectric loss can be successfully carried out by using mixed heating technology.

Through the conventional sintering and microwave sintering experiments of Al₂O₃, it can be found that compared with conventional sintering, microwave sintering has obvious advantages in technology and energy consumption, and its sintered ceramics have also been improved in physical properties and microstructures. Mixed heating is a very effective method for microwave sintering of low dielectric loss ceramics. Even if the preheater is used as a heating element to heat the sintered material, the heating performance of the preheater directly affects the heating rate of the sintered material.

We found that as the most commonly used preheater material, the heating characteristics of SiC under microwave field changed with the increase of usage times, which affected the heating effect of sintered materials at low temperature. In this paper, the heating characteristics of SiC under microwave field are studied, and the reasons why the heating characteristics of SiC vary with the number of times used are analyzed.