SUSCEPTOR INVESTIGATION FOR MICROWAVE HEATING APPLICATIONS

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Many low-dielectric loss ceramics do not couple well with microwaves at low temperatures. Susceptors are materials which couple well at low temperatures, and are often used to improve initial heat transfer. In this study, four materials were selected as possible susceptors: course grain and fine grain silicon carbide (SiC) from Research Microwave Systems (RMS), a course grinding grade SiC, and a dense hot pressed SiC. Susceptors were heated in a 1.3 kW, 2.45 GHz microwave unit and the time to temperature as well as heating rate for each was compared. The susceptors with the two highest heating rates and shortest times to temperature were used in varying masses to determine the effect of mass on heating rate and time to temperature. A constant mass was then used with varying refractory box free volume to determine this relationship. These relationships were then combined to create a microwave process control diagram that can be used to predict heating rate and time to temperature for various susceptor types, masses, and box volumes for varying microwave processes. Additionally, it was found that different firing temperatures require different susceptor mass in order to maximize the heating rate.