ABSTRACT

Microwave material sintering provides many advantages over conventional methods. This is a non-conventional technique, where materials absorb and convert electromagnetic energy into heat. The heating process is very different from other methods where heat is transferred through mechanisms of conduction, radiation and convection. The main advantages of microwave sintering can be summarized into three main points: reducing processing time and production costs, environmental benefits and processing flexibility. Therefore, microwaves are an attractive alternative to other sintering methods.

The main aim of this thesis is to obtain dense lithium aluminosilicate (LAS) ceramics with adequate mechanical performance and exceptional features by the non-conventional sintering technique of microwave heating for specific applications. The high thermal stability of these materials makes them useful for microelectronics, precision optics and aerospace technologies. Mechanical and thermal properties can be improved by microwave sintering technique.

To achieve this goal, the microwave sintering equipment will be optimized in order to obtain solid-state LAS materials and their final properties will be evaluated. As a complimentary phase, the feasibility of improving such properties by the addition of selected second phases, such as alumina and graphene, will be investigated.